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political economy of environmental hazards

PROTECTION OF LIFE SERIES

STUDY PAPER

Canada

POLITICAL ECONOMY
OF
ENVIRONMENTAL HAZARDS

Protection of Life Series

POLITICAL ECONOMY
OF
ENVIRONMENTAL HAZARDS

Protection of Life Series

A Study Paper prepared for the

Law Reform Commission of Canada

by

T. F. Schrecker

Une édition française de ce document
d'étude est disponible.
Son titre est:

L'ÉLABORATION DES POLITIQUES
EN MATIÈRE D'ENVIRONNEMENT

Available by mail free of charge from:

Law Reform Commission of Canada
130 Albert St., 7th Floor
Ottawa, Canada
K1A 0L6

or

Suite 310
Place du Canada
Montréal, Québec
H3B 2N2

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Catalogue No. J32-3/36E
ISBN 0-662-13236-X

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Author's Acknowledgements

The author would like, first of all, to express his appreciation to the Law Reform Commission of Canada for supporting this Study, and for its open and multi-disciplinary approach to the improvement of environmental protection in Canada.

A number of people took time out from busy schedules to help with the researching of this Paper. The author would particularly like to thank Dr. Robert Gibson, University of Waterloo and University of Toronto; Vincent Kirsch, Esq. of Kirsch and Sbrega, P.C., Massena, New York; Dr. Beth Savan, University of Toronto; Peter von Stackelberg, of the *Edmonton Journal*; and Toby Vigod of the Canadian Environmental Law Association.

The comments of Denise Jacques, Joe Gilhooly, Dr. Benjamin Freedman, Dr. Alex Michalos, Dr. John Last and Commissioner Louise Lemelin of the Law Reform Commission on earlier drafts proved extremely helpful in rewriting and condensing the Paper. Marie Tremblay of the Protection of Life Project provided a number of useful examples drawn from Québec environmental law.

None of the opinions or omissions contained in this Paper should be blamed on any of the above-named individuals; responsibility for these is strictly the author's.

Indispensable assistance and kind words were provided by Heather Kelly, Betty Rosenberg and Barbara Main of the Protection of Life Project staff. Thanks are also due to the staff of the Law Reform Commission library, in particular Donna Hellmann, for their help in tracking down numerous sometimes-obscure sources.

Finally, special thanks must go to Dr. E. W. Keyserlingk, Coordinator of the Protection of Life Project, whose infectious enthusiasm, continuous support and helpful suggestions are all deeply appreciated.

Introduction

In the context of environmental hazards, as in other areas, we normally think of "politics" only in terms of the process by which laws, regulations, and other instruments of governmental authority (such as tax penalties or incentives) are decided upon.

Yet it is a basic premise of this Paper that viewing public policy in these restricted terms captures only one set of influences on the process by which policy is made. The rationale for this viewpoint is perhaps most succinctly expressed by quoting from Schattschneider's discussion of the concept of "mobilization of bias:"

> Political conflict is not like an intercollegiate debate in which the opponents agree in advance on a definition of the issues. As a matter of fact, *the definition of the alternatives is the supreme instrument of power*.... He who determines what politics is about runs the country, because the definition of the alternatives is the choice of conflicts, and the choice of conflicts allocates power.[1]
>
> All forms of political organization have a bias in favor of the exploitation of certain kinds of conflict and the suppression of others because *organization is the mobilization of bias*. Some issues are organized into politics while others are organized out.[2]

Thus, "the political" should be taken to include not only the actions of elected officials and bureaucrats, but also the process of selecting the issues and defining the alternative courses of action which are considered by these (and other) actors.

The law, itself a product of the political process in both the broad and narrow senses of the term, will usually reflect similar mobilizations of bias. It is at least a credible argument that one of the major tasks of law reform, whatever the specific area of the law at issue, should involve examining the biases built into existing statutory instruments and procedures.

This Paper deals both with the process by which environmental hazard law and policy are made and with the conceptual frameworks which are used to define objectives and strategies for controlling environmental hazards. It is argued that both aspects of the policy process (what Leiss refers to as the "manifest" and "latent" politics of environmental issues)[3] organize certain important sets of issues out of the political arena. The important decisions (or, in Bachrach and Baratz's phrase, "non-decisions") are made before the issues ever reach the floor of a legislature or of a public hearing room.[4]

An exhaustive treatment of these questions obviously cannot be attempted here. Instead, this Paper embodies a broad-brush approach which suggests some general thematic conclusions and directions for further inquiry. The plan of the Paper is as follows: Chapter One provides a very brief critical overview of how policy on controlling environmental hazards is made in Canada. Existing statutes and distributions of political resources provide powerful advantages to one set of interested parties: the firms and industries which generate such hazards, rather than the individuals who are the recipients of them. Even at this overt level many conflicts are organized out of the policy process.

Chapters Two and Three deal with the issue of how alternatives are defined and presented, by examining the two most important conceptual frameworks involved in assessing the tasks and objectives of environmental hazard policy. Chapter Two discusses the ways in which scientific evidence is assessed and interpreted for purposes of public policy. It is argued that many important value judgments, which in fact would be the subject of political conflict if they were made explicit, are normally left unexamined in the way scientific evidence is treated.

Chapter Three looks at economics. Economics (and more specifically, the concepts of efficiency and optimality) have permeated the normative consideration of public policy in general to the point where some commentators refer to the "imperialism" of the discipline,[5] and others note that policy analysis has become almost synonymous with applied microeconomics.[6] Yet viewing problems such as environmental hazards from this point of view obscures a number of important (perhaps even essential) aspects of their creation. These aspects are political in the most fundamental sense: to rephrase Lasswell's definition of the political,[7] they have to do with who is entitled to do how much of what to whom.

Chapter Four briefly examines the role of the large profit-oriented corporation as a policy-making institution. Here again, we are not used to thinking in quite these terms. Yet the actions of such corporations, and the policies they pursue, are at least as important in determining the level of environmental hazards to which Canadians are exposed as are those of the governments which are charged with controlling such hazards.

Reconceptualizing the corporation as an institution which exercises political power is related to a more general underlying theme of the Paper. The system of property rights which allows business relatively unfettered control over investment flows, on the basis of maximizing profitability, seriously restricts the ability of governments to intervene in many kinds of decisions which are now the prerogative of the corporation. The restriction is not an overt one, but rather is embodied in the imperative of creating a favourable investment climate which is felt by virtually all governments, at all levels.

Chapter Five outlines a few general observations which follow from the analysis undertaken in the preceding chapters. These are not new or earthshaking conclusions; rather, they represent an extension of the discussion in earlier chapters to some general problems and objections which are almost certain to be encountered in the process of reforming environmental hazard law and policy.

In many places, space limitations preclude full discussion of complex theoretical issues. Such omissions make this Paper appear more polemical than was originally intended. However, every effort has been made to provide the outlines of its argument in enough detail to enable the reader to isolate points of disagreement. Readers who disagree with the strength or the nature of the conclusions reached may nevertheless be stimulated to engage in creative analysis of the constraints on environmental hazard policy.

A Note on Terminology

The term "environmental hazards" has been used to refer to the policy areas of environmental pollution, occupational health and safety and hazardous consumer products, in contexts where issues common to all these areas are being discussed. Where only one particular area is being discussed, that specific area is referred to as "environmental protection," "pollution," "occupational health," and so forth.

Almost exclusively, governments have approached the task of controlling environmental hazards through regulation: rules or requirements backed up, at least in theory, by the threat of penalties for violations. Many authors argue that financial penalties such as effluent charges should be distinguished from regulation *per se* because of the different level of immediacy of the coercion involved. Since this distinction is not generally relevant to the present Paper, the terms "environmental hazard control" and "environmental hazard regulation" have been used more or less interchangeably. Except in a few cases which will be clear from the context, the observations made apply equally to regulation and to other forms of government intervention backed up by sanctions or disincentives of some sort.

In Canada, the regulation of environmental hazards has for the most part been undertaken by departments of government. In the United States, by contrast, such regulation has been carried out largely by semi-autonomous agencies like the Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA). In this Paper, the term "agency" is used generically to refer to any governmental organization with regulatory powers and responsibilities.

CHAPTER ONE

The Politics of Regulatory Policy

I. Patterns of Regulatory Policy

Regulatory policy is considered here as comprising both the form and content of regulations and the regulatory agency's strategy and style of enforcement. At both provincial and federal levels, regulatory policy with respect to environmental hazards is normally made on the basis of negotiations between the agency concerned and the firms or industries whose actions are the target of the proposed policy initiative. These negotiations are usually conducted in secret. Those individuals or groups not party to the negotiations are seldom entitled to information about their substance, or even of their existence.[8]

In some cases, the process of government-industry consultation has begun at the stage of legislative drafting. The *Environmental Contaminants Act* (1975) represents the major piece of new federal environmental legislation enacted over the past decade.[9] It was hailed by the Minister who introduced it as an "early warning system" of potential environmental dangers,[10] and by his successor as "our main approach" to the problem of toxic substances in the environment.[11]

Parliamentary hearings on the law began only after close consultation with industry over at least two drafts of the legislation.[12] As a result, the chemical industry expressed general satisfaction with the Act,[13] while environmental organizations like the Canadian Environmental Law Association contended that the legislation contained numerous shortcomings.[14] In practice, the legislation has seen limited application; regulations have been made only with respect to a few substances which (with one possible exception) were already widely recognized environmental poisons when the Act was proclaimed.[15] By 1980, Environment Canada officials responsible for the Act's administration cited many of the same shortcomings isolated by environmentalists five years earlier, and argued that major strengthening amendments were needed.[16] Yet no revisions to the legislation have been forthcoming as of this writing (September, 1983).

The process of developing regulations under this and the other principal pieces of federal environmental legislation (the *Clean Air Act* and the *Fisheries Act*) is equally revealing. Regulations for specific industries are normally developed on the basis of the conclusions of informal task forces or steering committees composed of representatives of industry and of the federal and provincial governments.[17] Others do not participate. The task forces have generally taken a "best practicable technology" approach in determining desired control levels.[18] This system essentially precludes any technology-forcing role for regulation, since industry's arguments about the economic feasibility of emissions reductions are not subject to scrutiny and challenge by third parties.

Federal consultation with industry on environmental issues extends beyond specific topics, to regular meetings between senior Environment Canada officials and organizations like the Canadian Manufacturing Association, Canadian Pulp and Paper Association, Canadian Chemical Producers' Association, and the Petroleum Association for Conservation of the Canadian Environment (PACE).[19] As a general observation, the (then-) head of Environment Canada's Environmental Protection Service admitted in 1980 that "our consultation historically has been with the regulated, the regulatee, if that is the phrase, that is to say with industry."[20]

Testimony before the Parliamentary Special Committee on Regulatory Reform in 1980 indicated that other federal government departments also accord preferred status to affected industries. The head of Health and Welfare Canada's Health Protection Branch, for instance, noted that the department's timetable for making new regulations "is determined primarily by the amount of discussion [with the private sector] which is necessary in order to reach the final form of the regulation."[21] And Agriculture Canada's Advisory Committee on Pesticide Use in Agriculture includes industry representatives approved by the Canadian Agricultural Chemicals Association.[22]

These observations deal with environmental policy at the federal level. However, considerable evidence exists that provincial agencies behave in a similar manner, as documented in case studies of policy with respect to the pulp and paper and copper and nickel smelting industries in Ontario and Québec;[23] in an extensive study of the closed negotiation process by which control orders setting environmental objectives for specific plants in Ontario are developed;[24] and in more general overviews of environmental legislation and regulation making across Canada.[25] Thompson has summarized the pattern of environmental policy by noting that:

> ...*bargaining* is the essence of the environmental regulatory process as it is practised in Canada .... [T]he rules of environmental regulation are never clearly stated or certain, except in a purely symbolic sense. Instead the norms of conduct are the subject of negotiation and renegotiation between the regulator and the regulated right down to the moment of compliance or non-compliance.... Only if there is an ultimate disagreement is the enforcement procedure utilized, and even then its role may be but another step in a drawn out negotiation process.[26]

These comments and the case studies cited earlier illustrate that the process of determining substantive objectives for environmental protection is, in practice, inseparable from that of establishing and enforcing compliance timetables. Timetables, as well as environmental objectives themselves, are the product of government-industry negotiations;[27] they reflect the relative bargaining power of the two principal sets of protagonists — government representatives and industry representatives. In view of the arguments made later in this chapter (and in Chapter Four), it is not surprising that such timetables are characterized by considerable "slippage"[28] as industry compliance is repeatedly delayed and deadlines are repeatedly extended.

A similar pattern of negotiation appears to occur at the provincial level in the development of workplace exposure standards. Doern[29] notes that guidelines established in the 1970s for allowable worker exposure to vinyl chloride (in Ontario) and asbestos (in Québec) appeared to be constrained by industry's assessment of what it could afford in the way of control technology. More generally, the widespread absence of workplace exposure standards with legal force means that actual levels of worker protection are often negotiated more directly between employers and agency officials, whether administrators or inspectors.[30]

Sanctions are applied lightly and infrequently against violators of Canadian environmental or workplace health regulations. For example, twelve federal prosecutions of pulp and paper companies between 1970 and 1977 resulted in a total of $18,500 in fines; and the seventeen prosecutions launched by the province of Ontario between 1968 and 1976 resulted in fines totalling $86,250 — $64,000 of which resulted from one prosecution.[31] This pattern occurred in a context of persistent and nationwide noncompliance with the relevant environmental objectives.[32] A similar pattern of few prosecutions and sanctions which are trivial when compared with the probable savings resulting from non-compliance emerges from studies of occupational health and safety protection in British Columbia, Saskatchewan, Alberta and Ontario.[33]

II. Explaining the Patterns

Sabatier classifies regulatory agency behaviour, with specific reference to pollution policy, on the basis of "aggressive," "cautious," or "captured agency" patterns. These terms, which are largely self-explanatory, are defined with reference to the nature of the agency's objectives; its readiness to initiate and promulgate regulations; and its enforcement policies.[34] On the basis of the evidence, there exists a strong case for locating environmental hazard policy in Canada somewhere between his "cautious" and "captured agency" modes.

Sabatier explains the development of a particular mode of agency behaviour with reference to its legislative mandate; its resources, including staff size and expertise; the personal attitudes of its officials; the attitudes of its "sovereigns" (political masters); and the attitudes and resources of the constituencies with which it must deal.[35] He argues that constituency resources are in the long run the most important: a powerful (or powerless) constituency can affect the availability of all other resources.[36] Keiser has generated a very similar list of the factors affecting regulatory policy; at least some of the examples he cites appear to confirm the importance of powerful supportive constituencies (or their absence) to the ultimate success or failure of regulatory initiatives.[37] Somewhat modified in view of the differences between American and Canadian political systems, these lists of influences form the theoretical framework for the remainder of this chapter.

A. The Legislative Framework

Most environmental hazard policy in Canada is developed under enabling legislation which gives the relevant agency the authority to regulate certain kinds of activity.[38] Rarely, if ever, does legislation specify in any detail the criteria which are to govern the development of regulations, nor does it set out timetables for achieving particular sets of objectives. Similarly, legislation rarely stipulates that regulations *shall* be made (or enforced) in specific circumstances. Even in the case of imminent danger to human health, action normally is not required, but only authorized.[39]

The prevalence of enabling legislation is often traced to the number and complexity of the issues which must be addressed by contemporary public policy. Many substantive issues can only be dealt with effectively by a large and expanding public service.[40] Despite this necessity, the effect is to confer extensive discretionary powers on agency staff and the Minister and Cabinet to whom they report.

Paradoxically, the breadth of discretionary power is sometimes enhanced by the sweeping nature of offences created under environmental statutes which can be read as prohibiting the discharge of almost anything, anywhere, at any time.[41] The effect is not only to permit, but to require, the routine use of administrative judgment in determining the significance of pollution impacts.[42]

If legislation in some respects allows the unfettered exercise of discretion, in others it may seriously limit the options available. The *Environmental Contaminants Act*, for example, stipulates that the Ministers of Environment and of Health and Welfare must "have reason to believe" that a "significant danger to human health or the environment" may exist before even taking the preliminary steps of requiring industry to produce information or test chemicals for toxic effects.[43] The actual making of regulations must meet a stronger test: the Ministers must *be* satisfied of the existence of a present or future hazard, and that no other regulatory "action taken or proposed to be taken" will eliminate the hazard.[44] Analogous strictures are written into, among other pieces of legislation, the federal *Clean Air Act* and many provincial statutes.[45]

Such requirements are not just procedural niceties. They can be, and have been, used by industry to have regulatory initiatives thrown out of court.[46] They are seen by agency officials as reasons for caution,[47] and may generally predispose an agency to an approach which errs on the side of industry, at least unless the agency has made a clear commitment to (and has the financial and personnel resources to support) a strategy of clarifying the limits of regulatory authority through test cases. In Canada, such commitments are rare, if they exist at all.

Yet constraints imposed by legislation are accompanied by situations in which existing powers are not used. In some instances, provisions elsewhere in the legislation impose an onerous burden of proof on regulators before any action is initiated. For example, at least as of March, 1981, the power to require testing of new chemicals under the *Environmental Contaminants Act* had never been used, probably because of the statute's provisions on "significant danger."[48] In other cases, the reason may be less obvious. One might conjecture that a very good case could be made for controlling sulphur dioxide emissions under the *Clean Air Act*, because of their effects on human health and because of their contribution to the interprovincial and international phenomenon of acid precipitation, or for the unilateral designation of water quality management areas under the *Canada Water Act* (which, in turn, allows federal levying of effluent charges).[49] Yet the gains in environmental quality which might result have to be balanced by politicians and civil servants against the concomitant increase in federal-provincial tensions.

B. Agency Resources

Limits on an agency's resources restrict its ability to generate and systematize relevant information. Studies on occupational health and safety frequently observe that inspection staffs are far too small for the number of workplaces to be covered.[50] During Parliamentary committee scrutiny of the *Environmental Contaminants Act*, the Minister of the day indicated that proposals for universal pre-market screening of new chemicals were rejected because of the "very large number of highly trained experts" which would be required to implement such legislation.[51] And the Product Safety Branch of Consumer and Corporate Affairs Canada had a total budget of just under $2.5 million in 1979-80 with which to cover the entire field of potentially dangerous consumer products — entailing obvious limits on its research and investigative capabilities.[52]

By the nature of their activities, the firms and industries generating environmental hazards are uniquely well supplied with information on product and process characteristics, abatement technology and costs, production and effluent volumes, and numerous other variables.[53] In addition to the obvious constraints imposed by budget allocations, legislation can expand or limit an agency's resources without substantial public sector expenditure requirements, by giving (or withholding) authority to gather information from industry. An agency with limited resources, whether the limits in question are financial or statutory, will be forced into extensive reliance on industry-supplied information. This, in turn, can lead regulators to oppose access-to-information provisions in legislation or regulations because of fears that they might "break down that relationship with the industry that has served us very well in providing us with technical information."[54] At the enforcement stage, deficient resources can force an agency to rely on self-policing by the firms in question.

The importance of providing agencies with resources at least sufficient to evaluate the information provided by industry was dramatized in 1977. American investigators discovered (more or less by chance) that test results produced by IBT Laboratories and used as the basis for regulatory approval of more than 100 pesticides in the United States and Canada were invalid for reasons ranging from sloppy experimental procedure to apparent outright fabrication.[55] Yet the federal government's refusal to provide the requisite funding killed efforts in the late 1970s to develop a national toxicology laboratory in Canada which would have given regulators much-improved testing and evaluation capability.[56]

Resource limitations can affect an agency's policy in another, more pernicious way. Particularly when the "regulatee" is a large (and financially well-endowed) corporation, collecting the necessary evidence to mount a successful prosecution can consume a great deal of the time of an agency's scientific and legal personnel. Yet:

> ...the benefits of delay are typically so great in comparison with the costs of complying that there is little incentive for voluntary compliance, and a regulatory agency faces the possibility not of a handful of violators that it could reasonably and effectively handle, but of tacit noncompliance by large segments of an industry.[57]

An agency with the most aggressive intentions may be forced by limited resources into a strategy emphasizing negotiation, and into applying sanctions with a severity and frequency that varies inversely with the size and wealth of the offender.

Both agency resources and enabling legislation are functions of the broader priorities of the government in question. If obtaining particular kinds of information or legislative authority were considered a high enough priority, the needed appropriations or amendments would be forthcoming. Some legislative and most resource constraints should therefore be interpreted as follows: *Relative to other expenditure or legislative priorities* (this phrase is crucial), the initiatives in question are not important enough to the government of the day to warrant: space on the legislative calendar; an overall expenditure increase; or a cutback in expenditures on some other governmental function.

C. The Political and Administrative Context

This assertion makes sense because of a basic fact about parliamentary government, well stated by a former federal Environment Minister:

> Under our parliamentary system, a Prime Minister or a Premier with a majority has immense power.... [I]n 1688 we traded the divine right of kings for the divine right of a Premier or a Prime Minister with a majority at his or her back for a period of five years....
>
> So when there is no action at all by a government that has a majority, then that's clearly because they don't want to act. If they do want to act, the whole matter is relatively simple.[58]

Examples of the direct exercise of governmental power to limit the extent of environmental protection are not hard to find: the dissolution by statute of injunctions against polluting industries and sewage treatment plants in Ontario;[59] the legislated removal of riparian rights as a cause of action against polluters in Nova Scotia;[60] and the gradual reduction of the independence of the Environment Council of Alberta in that province.[61]

These are extreme instances. More important is the routine infusion of governments' political priorities into the regulatory process in ways both formal and informal. Even superficially independent regulatory tribunals such as the National Energy Board or the Canadian Radio, Television and Telecommunications Commission are subject to control by Ministers or Cabinet through changes in the agency's statutory mandate; appointments of members or commissioners; issuance of informal or formal policy directives; rulings on appeals to Cabinet of agency decisions; action by other departments or agencies, such as grants or tax subsidies, which affects industry behaviour; and decisions on agency budgets.[62]

In Canada, environmental hazards are regulated (with a very few exceptions) not by "independent" agencies, but by departments of government. These are subject to most of the same controls as semi-autonomous agencies, as well as others. Both the process and the rationale of departmental decisions can (and do) remain secret, with only the end results exposed to the glare of public scrutiny.[63] Many, perhaps most agency officials in policy-making roles are genuinely committed to reducing environmental hazards. Yet they must operate, very largely without being able to appeal to the public for support, in an organizational context characterized by numerous political and procedural handicaps. As a general policy priority, controlling environmental hazards may be at a distinct disadvantage in intra-governmental conflicts. At best, the ministers or officials of other departments may view this as an unwelcome competitor for legislative time and limited administrative resources. And departments with responsibilities for promoting industry, regional development, or natural resource exploitation may find concerns with hazard reduction irrelevant, or even antithetical to their principal objectives and those of their major client groups.

At the federal level, such considerations are important because major new programs or additional expenditures must be approved by Treasury Board and/or Cabinet's Envelope Committees.[64] Most regulations, even after extensive consultation with industry, must be approved by Cabinet — a process which may or may not be a formality.[65] In Ontario, to take but one provincial example, major policy proposals including legislation and regulations must go through a Cabinet approval process which evaluates, *inter alia*, the effect of the proposals on investment capital, the formation of new businesses, and "reduction of the incentive to work

[!]"[66] Politically controversial control orders, although they are not actually regulations, may also require Ministerial or even Cabinet approval.[67]

Another obstacle to regulatory initiatives, at least at the federal level, involves several stages of administrative approval.[68] Some of these steps are procedural measures designed to ensure proper legal form and authorization for regulations. However, provisions such as those of the *Environmental Contaminants* or *Clean Air Acts* requiring demonstration of the existence of hazards might enable elements of the bureaucracy with conflicting objectives to demand extensive substantive justification under the guise of ensuring statutory authorization.

Since 1978, major federal regulations dealing with health, safety and fairness have had to be accompanied by the preparation and publication for comment of a Socio-Economic Impact Analysis (SEIA) along Treasury Board guidelines.[69] Some federal and provincial legislation also allows appeal of a regulation to delay its implementation until scrutiny by a Board of Review or a similar body has been completed.[70]

Senior officials with regulatory responsibilities must be guided by the political priorities of the government. Sometimes these constraints are implicit: officials "know they must be politically attuned, and must avoid getting the Minister into unnecessary trouble."[71] Sometimes they are made very explicit. In 1982, the office of the Minister of National Health and Welfare instructed senior staff that all materials for release to the public (including technical publications) must be submitted for approval by the Minister's office before release. This requirement was itself the culmination of a multi-step approval process involving "the ADM, the deputy minister, the minister and on some occasions the director of information."[72] The rationale for this process, according to the Minister's office, was that:

> The Minister has been embarrassed on occasion when information disseminated from employees of the department has been presented to her by sources outside the department ... [A]s a result of several unfortunate experiences, directions were issued that ministerial approval must be obtained prior to the release of public information...[73]

Controlling environmental hazards normally involves several departments or agencies at both provincial and federal levels of government, often with disparate objectives and priorities.[74] Environment Canada sees provincial agencies as being more willing than themselves to adopt the industry point of view in negotiations over compliance timetables.[75] On the other hand, the International Nickel Company received federal financial assistance for extensive offshore investments, while failing to comply with Ontario pollution control requirements;[76] and Reed Paper

Ltd., again while failing to comply with such requirements, received several million dollars in direct federal grants from the Department of Regional Economic Expansion.[77]

Some of these conflicts arise from the conflicting roles of the state as promoter and regulator of industry. Others may have less fundamental roots. But their existence must be considered in any examination of the constraints on environmental hazard policy — especially since there may in practice be little one department or level of government can do about the effects of policies pursued by another.

D. The Constituencies of Regulation: How the Cards Are Stacked

1. Distribution of Costs and Benefits

Often, a very large number of people may stand to benefit from an environmental regulation, such as a limitation on the allowable lead content of gasoline. But the gain to most individual beneficiaries will be small — certainly not enough to give any individual a reason to spend large amounts of time and money supporting the regulation's enactment. Alternatively the benefit (*e.g.* increased longevity; avoidance of pain, suffering, or neurological impairment for oneself or one's dependents) may be very substantial, but it may be impossible for individuals potentially affected to tell in advance *who* among them will benefit, or the precise magnitude of the benefit. Some benefits may accrue only to future generations, further complicating the issue.

Conversely, the costs of environmental hazard regulation will be borne at least initially by a small number of relatively wealthy and well-organized actors: the firms or industries which must invest in abatement technology; finding less-toxic alternative process chemicals; or redesigning products. Such firms can therefore justify, on the basis of the potential payoff, the expenditure of large amounts of time, effort and money to oppose such policies.[78]

This analysis, of course, pays no attention to the disparity of resources between large business firms and individuals potentially at risk.[79] This factor would work in favour of industry even if affected individuals wanted to pursue the "irrational" course of attempting intervention in support of their own protection from environmental hazards.

In this context, as Wilson observes, "it may seem astonishing that regulatory legislation of this sort is ever passed."[80] He and other American observers[81] trace the spread of such legislation over the last decade or two to the emergence of political or policy entrepreneurs, such as Ralph Nader and some of his associates; journalists who specialize in environmental hazard coverage; and legislators with an advocacy approach to health and safety issues. "The entrepreneur serves as the vicarious representative of groups not directly part of the legislative process."[82] The Canadian political system, with its emphasis on party solidarity, its closed decision-making processes, and its infrequent reliance on coalition building at the legislative level, is probably far less hospitable than the American to policy entrepreneurship. More generally, policy entrepreneurs may be successful in initiating regulatory action, but they are unlikely to be successful in sustaining it, and in maintaining its effectiveness, in the absence of a constituency with more secure and substantial resources than those which determine the short-term success of entrepreneurial politics.

2. Information and Participation

Perhaps the most elementary aspect of access to the decision-making process involves access to information[83] — a point made succinctly, and rather humorously, by Sabatier:

> [A]n irate citizen who complains about the particulate emissions from a local steel company may well be met with the reply, "Yes, that is unfortunate, but the company is employing a precipitator which is reducing 90% of its emissions." The company's neighbor will be stymied unless he can reply, "Ninety percent effectiveness is not enough; *Chemical Engineering News* (*sic*) indicates that precipitators of 98% effectiveness are available and it's your job to see that they install one."[84]

The citizen in this case is at least aware that a problem exists. He/she may not be aware of: the actual chemical composition of the emissions; their possible health effects; how well the control measures already taken are actually working; categories of emissions for which no control measures are in effect or contemplated; the past history of pollution controls on the plant; government, industry, or consultants' estimates of the cost of more effective abatement; and the reasons given by industry for demanding (or by government for allowing) relaxation of previously imposed abatement requirements.

The arguments for freedom of information in the environmental hazard field have been extensively elaborated elsewhere,[85] and need not be repeated here. In general, few statutory entitlements to access to information exist in Canada. This means that access to this crucial resource is largely at the discretion of agency personnel.[86] It also means that potentially affected individuals or groups are often denied access to the kinds of information discussed in the previous paragraphs.[87]

Not even the imminence of a decision with potentially catastrophic effects need be divulged. For instance, no advance notice was published of 1979 federal regulations permitting AMAX Mines to dump 10,800 tonnes of heavy metal-contaminated tailings per day into Alice Arm, and the Nishga native people of northern B.C. state that they received no notice of the decision.[88] Yet the dumping had the potential fundamentally to affect their health and livelihood, not to speak of the more general long term ecological integrity of the region.

Industry — the chemical industry in particular — has strongly opposed the release of much of the information it provides to government, including toxicological test data. The argument is that such information is proprietary and confidential, and that industry should be consulted about any releases of information.[89] At least at the federal level, government appears to have accepted the industry argument with little demur. Draft Environment Canada guidelines on the release of business information, which were prepared before passage of the *Access to Information Act* rendered the exercise irrelevant, would have provided a modicum of access to information submitted by firms. However, they were strongly opposed by the Canadian Chemical Producers' Association.[90] Other departments routinely maintain the confidentiality of all information so designated by business.[91] The Environment guidelines probably would not have prevailed in practice over the *Environmental Contaminants Act*'s more pro-business provisions on trade secret confidentiality.[92] And the *Access to Information Act* itself specifically prohibits, except under certain circumstances, disclosure of trade secrets; confidential scientific or technical information; or information whose disclosure "could reasonably be expected to prejudice the competitive position of ... a third party."[93]

In 1976, Lucas concluded in an extensive review of Canadian environmental regulation that "there are few clearly established rights to participate in environmental decisions available to Canadian citizens. To the extent that citizens are permitted opportunities for participation, these are narrow, formal, and largely ineffective."[94] On the basis of Lucas' work and more recent overviews of the same subject,[95] the following general observations can be made, with the caveat that on most points isolated exceptions could be found.

Few, if any, opportunities exist for parties other than the regulatory agency to initiate the development of new regulations or related policy instruments to control environmental hazards.

Laws which appear to embody requirements or opportunities for more extensive participation (for example, by providing for the preparation of environmental impact statements or the holding of public hearings) can in practice be circumvented by the frequent and unappealable use of ministerial discretion to shield major, controversial or politically important projects from such scrutiny. The limited use which has been made of Ontario's *Environmental Assessment Act* is a frequently cited example.[96]

Where opportunities for public hearings, presentation of evidence and cross-examination of witnesses are provided, the conclusions of the process carry little force. Findings and recommendations of hearing panels may be ignored or overruled by ministers or Cabinet. Many public hearing processes are explicitly advisory in nature, as is the case with the federal Environmental Assessment and Review Process (EARP) for new federally sponsored projects,[97] and the range of *ad hoc* inquiries which have been set up to examine various environmental issues.[98] The impact of such advisory proceedings, if any, is likely to result from the publicity they generate; from exogenous political considerations; and from the ability of pre-existing constituencies to make use of inquiry testimony and conclusions.[99]

Yet one can also argue that public inquiries have served an important legitimizing function by providing the form of public consultation and involvement, without the substance. Conversely, the actual process by which the form and content of policy instruments and enforcement are decided upon is as a rule "entirely the province of the agency, unrestrained by any requirement to make decisions on the record or by any requirement that public participation be permitted."[100] It is also unrestrained by any requirement that outside parties be allowed to scrutinize the information on which a decision is based. As just one example, federal officials refused to release any toxicological data on the pesticides approved on the basis of invalid IBT tests, arguing that the data were confidential and that they could be sued for releasing them.[101] They also refused to release the information on economic impacts on which they allegedly based the decisions to leave almost all the suspect pesticides on the market pending evaluation of the test data or retesting.[102] No way of initiating a review of either decision was available.

Statutory provisions for initiating review of a proposed measure may simply provide another bargaining lever for industry. Ontario's *Environmental Protection Act*, for instance, allows polluters to appeal the provisions of a Control Order to an appeal board, an action which stalls the order until the appeal is completed, but denies that right to other parties who might wish to advocate strengthening, rather than weakening, the order.[103] Similarly, opponents of a regulation under the *Environmental Contaminants Act* can precipitate the convening of a Board of Review, an action which delays any regulatory action until review is completed. In such situations, industry can threaten expensive and time-consuming delay when the outcome of regulatory negotiations still does not conform to its priorities or timetable.[104]

Even relatively open and participation-oriented processes do not necessarily generate aggressive regulatory policy. For instance, the public participation provisions of Ontario's *Occupational Health and Safety Act* have been widely praised by commentators, yet only a handful of exposure standards with legal force have been promulgated since its passage.[105] This may be because of limits to the initiation of regulatory activity: parties outside government are normally limited to responding to governmental initiatives, and can do little in a formal sense to speed up the process of initiating activity. The limited impact of public participation may also be a function of industry's dramatically superior financial and organizational resources.

3. Industry Influence: Financing and Organization

Many government departments become promoters of certain interests, such as agriculture or the mining industry, on the basis of functional relationships. The industrial firms in a jurisdiction have a great deal to do with the ultimate success of policies followed by a department of industry; road-builders' associations with those of a department of highways; and doctors and pharmaceutical manufacturers with those of a ministry of health.[106] Such organizations and their members are also often repositories of essential information. As a result of this central role, such constituencies are listened to much more often, and more carefully, than are "non-functionally related" groups.[107]

The firms or organizations which generate environmental hazards must also be dealt with in day-to-day operations by departments whose mandate includes their control. Environment departments and other agencies responsible for controlling environmental hazards may form links with citizen organizations concerned about such issues. But these organizations, unlike the affected industries, cannot directly or materially affect the success or failure of agency policies. Industry must usually be dealt with to ensure compliance; is often relied upon to do the necessary testing; must often supply necessary information.

This may explain why (for instance) Environment Canada's contacts with environmental groups appear to be less direct and routinized than those with industry associations.[108] It may also contribute to agencies' caution or antipathy toward more open access to information and decision making. Such changes might disrupt relationships with industry which, if not cordial, are at least harmonious enough to enable the agency to carry out its tasks on the basis of some modicum of co-operation.[109]

Another factor sustaining industry's preferred access to decision making is the extensive financial resources to which individual firms and industry organizations have access.[110] A recent study of the chemical industry in Canada found that its ten major associations had an average staff of 7.25 people and an average annual budget of over $350,000. Some associations, obviously, had much larger staffs and budgets. Member firms can also donate the time of their staff for association activities — a substantial financial commitment which never shows up in the association's budget.[111]

Business, in general, enjoys the further advantages of multiple representation and multiple points of access. The study cited above found that major chemical companies like Dow and Esso would not only be members of several industry associations, but would often be represented on their boards of directors.[112] The nature of trade associations is such that environmental hazard policy is normally just one among many areas in which they articulate their members' interests. Their routine interactions with government include many departments, including functionally related ones which can emerge in the councils of government as direct adversaries of increased hazard protection.

The usual disparity in resources between supporters and opponents of the control of environmental hazards is especially important in view of the frequent observation that major symbolic changes in policy, such as passage of new legislation or creation of new departments or branches of government, are not followed by the kinds of substantive changes (in regulation, enforcement, expenditure patterns, and so forth) which one might be led to expect.[113]

> The general implication of the theory of symbolic legislation for environmental concerns is that we should expect "tough" legislation to satisfy environmental groups and the general public, and weak enforcement with many complex exceptions to provide an accommodation with the pollution sources themselves.[114]

Ensuring that symbolically powerful legislation is followed up with appropriate information gathering, regulation making and enforcement is difficult and time-consuming. In the absence of financial and organizational resources at least roughly commensurate with those enjoyed by business groups, supporters of environmental hazard protection (even if already organized) will have a great deal of trouble ensuring that public policy as actually implemented reflects the promise of "tough" legislation.

This dichotomy between substantive and symbolic policy outputs is the reason this Paper gives short shrift to the function of policy entrepreneurs. Unless they (or, for that matter, regulatory agencies themselves[115]) are able to build up the resources of supportive constituencies to the point where they can keep watch over the process of implementation on a day-to-day basis, policy entrepreneurs — however conspicuous — may not successfully produce long-term shifts in government policy.

The general principle that "public interest" groups need financial assistance to carry out such a function, or even to prepare effective interventions before public hearings, has been widely acknowledged in Canada.[116] The Economic Council has argued that:

> If reforms designed to improve the openness, equity, legitimacy and accountability of regulation are to succeed, governments must also take steps to ensure that those interested groups and individuals can participate on a reasonably equal footing.... Funding for "public interest groups" must be considered as an essential component of regulatory reform.[117]

Such proposals have met with considerable resistance from business.[118] Treasury Board refuses to provide funding "indiscriminately,"[119] and analysts wrestle with the issue of how "accountability" for the use of funds can be ensured.[120] The Ontario government, on the other hand, provided no-strings-attached funding to major waste disposal firms for participation in hearings on the environmental impact of their proposals, while refusing similar funding to the projects' opponents.[121] More generally and more importantly, the fact that advocacy expenses of various kinds are tax-deductible as a business operating expense provides a consistent subsidy to business which — at the full corporate tax rate — amounts to roughly half of every dollar of such expenditure.[122]

This funding mechanism is indiscriminate. There is no way of ensuring accountability, nor are recipients required to demonstrate responsibility. Yet the subsidy keeps on being paid, year after year, even in a climate of fiscal restraint. Within our political economy, only the purposes of business appear to be regarded as sufficiently legitimate to warrant the waiving of demands for "accountability" in the use of public funds.

4. Industry Influence: The Broader Context

Analysis of the statutory biases which favour industry, and of its superior financial and organizational resources, is important to understanding the workings of regulatory decision making. Yet as the example just cited suggests, these factors do not provide a fully satisfactory account of why governments consistently accord a high legitimacy to the priorities of business.[123]

One of the most basic functions of governments in industrial societies is the promotion of economic growth as a means of enhancing the well-being of their citizens. Failure to achieve this objective tends to magnify distributional conflicts, and to limit the revenue base on which governments rely to finance other activities such as the transfer payments to individuals which we have come to think of as comprising the welfare state.[124]

In this context, business' role as a provider and controller of investment all but guarantees it a uniquely preferred status with respect to a broad range of government decisions.[125] This phenomenon's various manifestations comprise what Mahon calls the "unequal structure of representation" within the policy process.[126] Statutory roadblocks to public participation in the decision-making process; the reluctance of governments to remedy these constraints; and the double standard applied on the one hand to proposed direct expenditures on funding public interest groups and, on the other hand, to the existing and ongoing tax expenditure subsidy to business advocacy are, it may be argued, just specific instances of this more general bias.

More generally again, at least as important in explaining the advantageous position of business in environmental hazard policy are value choices which take the form of non-decisions implicit in the theoretical frameworks used by governments and their academic and technical advisors to select and evaluate policy alternatives. These are the subject of the next two chapters.

CHAPTER TWO

The Politics of Science

I. Introduction

A fundamental task in making public policy on environmental hazards is the assessment and interpretation of scientific evidence. Yet far from being a neutral, "objective" undertaking, this process involves a number of significant value and political judgments which are seldom examined.[127]

In the context of environmental hazard policy, Franson has noted the importance of distinguishing the concepts of burden of proof and standard of proof. Burden of proof refers to the assignment of the duty to produce evidence (for instance, as it falls on the plaintiff in a civil action or on the prosecution in a criminal case). Standard of proof refers to the strength of the evidence which must be adduced to prove a particular hypothesis (for example, proof "beyond a reasonable doubt" to prove the hypothesis of guilt in a criminal case).[128]

Chapter One notes that the burden of proof is often assigned to those arguing for control of a particular hazard, whether by statute or as a result of the nature of the policy process. The question of what kind of evidence will be sufficient to provide a demonstration of potential danger, or of safety, is at least as important. In practice, these two questions can be very hard to disentangle. Even where the burden of proof is nominally imposed (as in the case of prescription drugs) on the proponent, the application of lenient standards of proof can turn the process into a ritual which embodies a presupposed right to market, pollute, and so forth, and in which approval is almost automatic. Conversely, where statutory or political considerations compel regulators to adhere to a strict standard of proof in demonstrating, for example, "significant danger," the result can be immobilization[129] of the regulatory process.

II. The Treatment of Uncertainty

A. False Positives and False Negatives

Page analyzes the issue of standards of proof in environmental hazard policy in terms of two contrasting principles: limiting false positives and limiting false negatives.[130] A false positive is an indication in a study or inquiry that a stated hypothesis is true when it is not; a false negative is a finding that there is insufficient evidence for a hypothesis which is, in fact, correct.

As Page points out, the criminal justice system operates on the principle of limiting false positives. It is considered far more objectionable to convict an innocent individual of a crime than to fail to convict a guilty one; thus, the prosecution must adduce enough evidence to meet a very high standard of proof. Limiting false positives is also, however, a principle underlying much experimental science. Tests of the toxic effects of a particular chemical are not considered to substantiate the hypothesis that the chemical causes a particular effect in test animals unless the results can be stated with a high degree of statistical confidence (usually 95 per cent, which corresponds to only a five per cent chance of a false positive).[131]

Relatively little attention has been paid in environmental hazard policy to the probability of false negatives — that is, findings of no statistically significant effect when in fact an effect exists which would demand a policy response if it were known. In individual laboratory experiments, such as those involving the carcinogenic effects of chemicals, false negatives may be very likely. "For the most commonly used bioassay for potential carcinogens, for which there are 50 animals in the control group and 50 in each treated group, [the chance of a false negative] may be greater than 50 percent."[132] Statistical complexities introduced by such factors as multiple tumor sites may mean that the real probability of false negatives is even higher (74 per cent, in one hypothetical example developed by Page).[133]

A strong tendency to generate false negatives is not unique to laboratory experiments. In epidemiological studies to detect increases in cancer rates, it can be very difficult to determine the exposed population and the actual levels of exposure.[134] This is one reason many epidemiological studies involve worker populations; if the study is properly designed, all individuals will have had at least some exposure to the suspect substance or process. But even with the best design in the world, statistical constraints mean epidemiological studies will tend to "lose" moderate increases in cancer incidence among large populations exposed to a particular substance.[135]

The industry-sponsored American Industrial Health Council, ignoring such limitations, argues that "[n]egative evidence from epidemiological studies in humans should be given more weight than positive results in animal bioassays."[136] Yet the consequences of basing policy on false positives may be far less serious than those of acting on the basis of false negatives. Page uses the example of the effects of chlorfluorocarbon aerosol propellants on the ozone layer. Minimizing the chance of a false positive by waiting for conclusive evidence of effect, in order to preserve a trivial benefit (more convenient spray containers), ignores the possibility of a potentially catastrophic and irreversible ecological effect.[137]

This asymmetry is a defining characteristic of many of the problems Page calls "environmental risks," in contrast to more familiar problems of point-source air and water pollution. The general principle of limiting false negatives — in contrast to the limitation of false positives which has guided most regulation of environmental hazards — could be characterized as one of erring on the side of safety. But safety in this context is defined in terms of avoiding the uncertain, but potentially disastrous, adverse effects of the particular substance or activity in question.

Not everyone would agree with the judgment that the risks attendant on limiting false positives are less serious than those of limiting false negatives. An executive of Stauffer Chemical claims that the reductions in innovation, capital investment and productivity resulting from the application of the U.S. *Toxic Substances Control Act* will themselves have adverse effects on human welfare. "[W]e might ask ourselves how many of the aged, frail or other individuals at risk in society will die prematurely and needlessly because we are unable to provide the technology to sustain or cure them."[138]

This is a specific manifestation of a more general argument about the risks to welfare which supposedly result from slow economic growth as society becomes too concerned with risk avoidance — implicit in which is the assumption that only continued growth will ensure continued increases in well-being.[139] In such cases, as in many others, when industry spokesmen or government officials argue that action to control a potential hazard should be deferred until more conclusive evidence is available, what they are really saying is that the adverse consequences of acting on a false negative are sufficiently less serious than those of acting on a false positive to justify taking no action for the moment. It is also important to note that a decision to defer taking regulatory action does not avoid this issue: indeed, such deferrals represent "non-decisions" of considerable significance.[140]

Beverley Paigen, a scientist actively critical of governments' slowness in relocating Love Canal residents, provides a useful example of how this type of judgment is embodied in assessments of scientific evidence. She relates:

> ...a conversation I had with a Health Department epidemiologist concerning the data on adverse pregnancy outcomes at Love Canal. We both agreed that we should take the conservative approach only to find that in every case we disagreed over what the conservative approach was. To him "conservative" meant that we must be very cautious about concluding that Love Canal was an *unsafe* place to live. The evidence had to be compelling because substantial financial resources were needed to correct the problem. To me "conservative" meant that we must be very cautious about concluding that Love Canal was a *safe* place to live. The evidence had to be compelling because the public health consequences of an error were considerable. And so we disagreed on specific detail after specific detail.
>
> This is not a scientific issue, nor can it be resolved by scientific methods. The issue is ethical, for it is a value judgment to decide whether to make errors on the side of protecting human health or on the side of conserving state resources.[141]

B. The Case of Cancer

Perhaps nowhere is the normative content of the weighting of uncertainty more important, and less often acknowledged, than in making decisions about whether or not to treat a particular substance as carcinogenic for purposes of public policy. The firms and industries whose activities are at issue often argue that exposures to particular substances should not be considered to cause cancer unless at least some corroborative human evidence exists.[142] The demand for human evidence before action to control or eliminate exposures is considered amounts to waiting for the body count — particularly since the long latency period of many cancers means that one or more decades might have to elapse after initial exposure before patterns of cancer incidence could reliably be detected.[143] This is exactly what has happened with respect to workplace exposure to any number of substances, with asbestos probably being the one with the longest (and most scandalous) history.[144] Additionally, the limitations of epidemiological evidence may mean that only striking and obvious toxic effects of chemical exposures can be detected.

Because waiting for confirmed human cancers amounts to testing the substance on human beings, the use of animal tests to assess carcinogenicity in human beings is widely agreed upon. An International Agency for Research on Cancer working group points out that:

> [I]n the absence of adequate data in humans it is reasonable, for practical purposes, to regard chemicals for which there is sufficient evidence of carcinogenicity (*i.e.*, a causal association) in animals as if they presented a carcinogenic risk for humans. The use of the expressions "for practical purposes" and "as if they presented a carcinogenic risk" indicates that at the present time a correlation between carcinogenicity in animals and possible human risk cannot be made on a scientific basis, but rather only pragmatically, with the intent of helping regulatory agencies in making decisions related to the primary prevention of cancer.[145]

This statement provides a guideline for the weighting of uncertainty at a relatively general level — that of animal versus human evidence. However, the issue is equally important in the determination of what should constitute "sufficient" evidence of carcinogenicity in test animals. Industry groups argue that tests in two different species should both show positive results before carcinogenicity is assumed.[146] In this context the high probability of false negatives in standard animal tests (as opposed to the low probability of false positives which is designed into the statistical tests applied to experimental evidence) should be kept in mind. Page has noted that:

> In recent years industry groups have increasingly asked for negative findings to be taken into account in the regulatory process. *However, there is literally no information content* in a negative finding unless there is an analysis of ... the probability of a false negative.[147] [Emphasis added]

To support demands for positive results in two or more species, or demands for corroborative human evidence, it is often claimed that certain test animals are hypersusceptible to tumor induction, relative to man.[148] On the other hand, Schneiderman notes that the opposite might also be true in some cases, and that "a safety-oriented bias requires that we assume that man is as sensitive as the most sensitive animal species tested."[149]

Suspected carcinogens are tested on animals at doses several orders of magnitude higher than those to which a human being would be exposed, because this is the only way to induce a high enough number of tumors to produce statistically significant results in a manageable number of animals. Essentially, what is done is "to make one animal stand in for a thousand — by increasing the dosage."[150]

"Translating" experimental results on laboratory animals into estimates of additional human cancers from exposures which may be 1/1000 or 1/10,000 of those used in laboratory tests requires calculations using a mathematical model of the relationship between dose (exposure) and response (tumor induction). Several such models, rooted in different theories about the process of cancer causation, may fit the data equally well at the high exposure levels observed in the laboratory. But the results they produce differ dramatically at the low dose levels which correspond to probable human exposures.[151] The choice of "scaling factor" used to determine how exposures in test animals correspond to human exposures adds another element of uncertainty.[152]

Schneiderman has found that applying four different dose-response models to the same experimental data on the carcinogenicity of vinyl chloride in laboratory animals produced estimates of the number of additional human cancers which would result from low levels of exposure which varied by three orders of magnitude.[153] Similar variations of at least two orders of magnitude have been observed in predictions of cancer risk from the same exposure to nitrates/nitrites and saccharin.[154]

A continuing controversy in cancer research involves the concept of "thresholds" — levels of exposure to a given substance below which the number of cancers induced will be zero, or at least proportionately much lower than at higher exposure levels. Some models of the dose-response relationship suggest the existence of thresholds, but others support the "linear hypothesis" that the more or less direct relationship between dose and cancer induction observed at high exposure levels occurs at low levels as well.[155]

Schneiderman concludes an extensive review of available human and animal evidence by saying that no conclusive evidence exists for the existence of thresholds in animals or man.[156] A "mega-mouse" experiment involving 24,000 animals suggested the existence of a threshold for cancers at one site, but a linear dose-response relationship for cancers at another.[157] Critics have cited serious statistical problems even with this large number of test animals, however.[158] Given the roots of dose-response controversies in competing theories of cancer causation, a definitive scientific consensus on this issue does not seem likely in the near future.[159] Yet for purposes of public policy, some resolution of the controversy over dose-response relationships, however tentative, must be reached.

Defenders of a linear hypothesis argue not only that it is justified by the available body of knowledge on mechanisms of carcinogenesis, but also that it is preferable as the safety-oriented approach.[160] Like Paigen's "conservatism," this view embodies the judgment that it is preferable to limit false negatives (with their possible long-term consequences for human health). Some scientists cite as a further reason for erring on the side of safety the possibility that the combined effects of two or more substances present in the environment may be much more serious than merely the sum of the two individual sets of effects.[161] The issue of interactive effects is not merely a debating point. Such effects have been observed on an epidemiological basis with respect to exposure to cigarette smoke and asbestos fibres or alcohol.[162] In the laboratory they have been demonstrated to occur following exposure to specific combinations of a few of the 200 or so chemicals present at Love Canal,[163] and to a mix of trace elements for which IJC water quality objectives were in effect, at exposure levels well within allowable limits for each individual contaminant.[164] Only the stronger of such effects would likely become evident among exposed human populations even in retrospect, and it is obviously impossible to test for interactions among the thousands of contaminants to which people are potentially exposed in their air, food and water.

As noted earlier, IARC's approach to the question of animal versus human evidence is strongly safety-oriented. However, at the level of assessing animal evidence, IARC requires as "sufficient" evidence of carcinogenicity:

> ...an increased incidence of malignant tumors (a) in multiple species or strains; (b) in multiple experiments (preferably with different routes of administration or using different dose levels); or (c) to an unusual degree with regard to incidence, site, or type of tumor, or age at onset.[165]

The United States National Cancer Institute (NCI) rates the degrees of evidence for carcinogenicity in a number of categories, based on the number of species in which carcinogenicity has been found; the number of experiments finding increased tumor incidence; and the magnitude of the increase in tumor incidence.[166]

These classification schemes reflect very strongly the conventions of scientific caution, which have developed in order to ensure a high standard of proof with respect to the hypothesis under consideration — that is, to minimize the chance of false positives. *This is no criticism of them.* The danger is only that such conventions can be transferred to public policy without a full awareness of the implied value judgments about the relative consequences of false positives and false negatives.

The lack of explicit attention to such considerations (including not only the kinds of consequences involved but their distribution) may be very much to the advantage of the opponents of controlling exposure to a particular potential carcinogen. Industry can argue that a "firm scientific basis" should exist for regulating exposure to carcinogens or other toxic substances,[167] when the real issue is not the firmness of the scientific base but rather how, and to whose advantage, the inevitable uncertainties attendant on the use of scientific evidence in public policy should be resolved. It is much less palatable — and invites much more fundamental debates — to raise the question in this way than to cast it in the superficially value-free terms of "scientific" discourse.

C. Scientific Evidence: Some Further Limitations

It is almost trite to observe with respect to social science research or inquiry that the way a particular question is asked may limit, in very important ways, the kinds of answers it is possible to get.[168] This caveat applies with equal force to research in other experimental or quasi-experimental situations. One British study, for example, appears to confirm the conventional wisdom that the driver, not the automobile, is the most important factor in road accidents.[169] But the study considers the vehicle's contribution to serious accidents only in terms of defects such as brake failures, blowouts, and failures resulting from improper maintenance. The study might have come to sharply different conclusions had it concerned itself with the adequacy of the *normal* performance of vehicles in terms of parameters such as stopping distances or evasive manœuvrability.

Studies correlating miscarriage frequency with location as determined by street address concluded that miscarriage frequency did not increase with proximity to the Love Canal. Paigen argued that if (as she suspected) chemicals were migrating from the canal *via* underground drainage routes into residents' basements, then proximity to the drainage routes (swales), not to the Canal, would be the relevant variable. On this basis, the same data showed a threefold increase in miscarriages in households near the swales, and a strikingly elevated incidence of multiple miscarriages.[170]

The most familiar example may be that of the nuclear power debate. Supporters of nuclear power argue that since the health effects of operating nuclear power plants appear to be less serious than those of comparable coal-fired generating capacity, nuclear power is a preferable energy option. Many nuclear opponents argue that this is an incomplete and specious comparison. We should, they argue, be comparing the health and economic impacts of both electric and non-electric energy sources, *and* of improvements in the thermodynamic efficiency of energy use, as ways of meeting the increasing demand for the specific services — such as space heating and mechanical work — whose provision requires the consumption of energy.[171]

Such differences in the formulation of hypotheses are legitimate, and inevitable. The conflicting conclusions they generate are only pernicious in the field of public policy when the underlying assumptions are concealed, or when they cannot be challenged and therefore need not be defended. These disagreements also provide an excellent opportunity for the selective support of science by actors with a strong interest in the outcome of a particular conflict. Industries may want to avoid the more stringent regulation which might follow from the acceptance by government of a particular hypothesis. And government agencies may wish to avoid challenges to their particular priorities in the weighting of scientific uncertainty, whether because of a desire to conserve government funds or because of a perceived need to avoid conflict with the private sector. In other instances, governments may simply be applying uncritically and unreflectively the scientific convention of emphasizing the limitation of false positives.

In a history of asbestos research, Kotelchuck finds that industry-supported studies consistently attempted first to deny, and later to minimize, the significance of asbestosis and lung cancer hazards. Studies without industry support consistently implicated asbestos in both diseases.[172] Martin isolates an analogous pattern in which university-based researchers emphasized the environmental dangers of SST exhaust; those under contract to aircraft companies or government agencies supporting the SST minimized these dangers.[173]

Both Kotelchuck and Martin emphasize that these differences do *not* normally indicate any lack of competence or integrity on the part of the scientists involved. Indeed, Martin points out that a particular set of "presuppositions about what it is considered necessary to prove" will characterize almost every scientific endeavour[174] — an observation with obvious relevance to the studies of road accidents and miscarriages cited previously. Sometimes these presuppositions will be far easier to detect (or more relevant for public policy) than at others.

It is sometimes hard to distinguish among legitimate differences in problem definition; questionable or even blatantly self-serving assumptions; and outright fraud or misrepresentation. Industry has argued that exposure to organochlorine pesticides[175] and asbestos[176] has not produced increased cancer incidence in exposed workers, on the basis of epidemiological studies. But the sample populations included workers many, or most of whose exposure to the suspect agents was brief or relatively recent. This procedure is clearly questionable when latency periods can be twenty to forty years. However, it does enable industry to quote overall results which show no increases in cancer mortality. In a much clearer example of self-serving science, Dow Chemical scientists, reporting results of a 1971 study on birth defects resulting from exposure to 2,4-D, redefined the word "teratogenic" to enable them to conclude in a study summary that the herbicide was not teratogenic, although it did cause birth defects in the offspring of exposed laboratory animals.[177]

An American investigation concluded that industry-sponsored tests of twenty-three pesticides, submitted to government agencies for the purpose of determining allowable residues in food, were almost universally inadequate. Defects included using too few animals; replacing animals which died during the study; allowing animals to decompose to the point where autopsy was impossible; failures to examine tumors in test animals; inaccurate tabulation of data and absence of statistical analysis; the neglect of particular observed effects because they were judged unrelated to the compound being tested; and summaries which downplayed the significance of observed effects.[178] Epstein has provided a number of similar examples of faulty chemical test data, in the American context.[179] U.S. Food and Drug Administration audits of clinical trials of new pharmaceuticals have come up with numerous cases of strange and unacceptable procedures.[180]

Given Canada's widespread reliance on American test data,[181] the examples are clearly relevant in the Canadian context. If systematic evaluations of test data quality have been done in Canada, they are kept secret by the relevant agencies. The fact that defective test data produced by IBT Laboratories were used for the regulatory approval of more than one hundred pesticides in both countries suggests that such evaluations are not part of the normal routine of regulatory agencies in either country.

Beyond inadequate or useless testing, at least a few cases suggest deliberate concealment from regulatory authorities of test data on adverse health effects, including the relevant industries' treatment of experimental results on vinyl chloride[182] and of both laboratory and clinical trials findings on a number of pharmaceuticals.[183] The lack of space devoted to this issue does not imply its lack of importance; it constitutes one of the most blatant abuses both of public trust and of the policy process in the entire environmental hazard field. But the problem of fraud or concealment is conceptually less intractable than the more general challenge of isolating the non-decisions which are a routine part of the treatment of scientific evidence in public policy. And at the level of implementation, fraud is almost certainly a simpler issue to deal with, *if* the political will exists to do so.

D. Science and Values: Policy Responses

Governments generally appear to adopt an uncritical attitude toward scientific information provided by industry for purposes of assessing the damage caused by its activities. The discoveries of concealment of data on the drugs MER/29 and Flagyl, and of the IBT testing debacle, occurred as a result of coincidence rather than as a result of systematic review or auditing of industry data.[184] In such contexts, regulatory requirements for submission of scientific data are almost pointless unless the agency in question has the authority and resources to check the veracity and validity of the information supplied, or *at least* has the authority and willingness to release it, uncensored, for scrutiny by third parties.

The problem of inadequate scrutiny of scientific data may be particularly serious in Canada because of limits to agency resources. The director of Health and Welfare Canada's Bureau of Human Prescription Drugs said in 1982 that the Bureau's ability to review new drug applications is limited both by insufficient staff and budget, and by legislation which appears not to provide authority even for some of the demands the Bureau currently makes of applicants for new drug approval.[185] Chapter One noted that federal authority to require testing of new or existing chemicals for their environmental effects appears limited — as does the government's inclination to do anything about these limits.

A second consistent characteristic of Canadian (and other) policy responses is the "more research syndrome." This involves responding to evidence of a possible hazard by setting up a study to review the evidence and to gather additional evidence. Sometimes this game can be played out for several rounds. For example, after an abortive initial attempt to shut down Toronto lead smelters in 1973, the Ontario government responded, not by pursuing other legal avenues (such as direct regulation) to cut their emissions, but by appointing successively a Ministry of the Environment Working Group, a Ministry of Health Task Force, and an Environmental Hearing Panel to sort out and rehash the recommendations of the Working Group and the Task Force.[186]

Health and Welfare Canada did not release a 1969 survey of arsenic levels in the bodies of Yellowknife area residents (the result of emissions from gold mining and smelting operations) until 1974. When the study was finally leaked to journalists in that year, the federal government responded by convening two additional studies, in 1975 and 1977.[187] By April 1981, no regulatory action had been taken beyond requiring metallurgical industries emitting arsenic to tell the government how much arsenic they were emitting.[188]

The substitution of more research for control is one manifestation of the third, and most general, characteristic of governmental responses to environmental hazards: the predominant concern is with limiting false positives. Conversely, the probabilities of false negatives are given scant attention, and their consequences are often allowed to proliferate unchecked.

Thus both federal and provincial governments have argued for years that no demonstrated or proved link existed between aerial pesticide spraying to control the spruce budworm and numerous deaths from Reye's Syndrome; and hence, that the spraying should continue.[189] This position has been defended despite laboratory evidence of the viral enhancement effects of the emulsifiers used,[190] and despite a National Research Council panel on the effects of spraying Fenitrothion, whose chairman was at pains to point out that the fact that the evidence against the spraying was not conclusive, did not mean that either the pesticide or its emulsifiers had been given a clean bill of health.[191]

The treatment of evidence in the Toronto lead controversy was similar. The Hearing Panel, chaired by a senior provincial civil servant, concluded in 1976 that (for example) evidence of neurological damage and learning disabilities at very low blood levels was "equivocal."[192] Yet the Panel did not hesitate to conclude that "there is no serious health problem related to lead in Toronto," or to accuse the residents of the areas potentially affected of emotionalism and of playing politics.[193]

The tendency of scientists employed in government, and of government-appointed scientific advisors, to reach conclusions not greatly at variance with governments' existing positions is hardly a unique observation.[194] Gillespie suggests that the extent to which such positions prevail unchallenged depends heavily on the nature of the decision-making process in which such evidence is presented and evaluated.[195] The process by which the carcinogenicity of the pesticides Aldrin and Dieldrin was determined for regulatory purposes in the United States involved a public and adversarial hearing process, in the course of which challenges to the interpretations of evidence by both industry and government experts could be presented. The Environmental Protection Agency (EPA) had just recently taken over pesticide regulation from the Department of Agriculture and had, unlike the Department, no responsibility for agricultural production and no ongoing relationship with producers of agricultural chemicals. Indeed, EPA's legal staff were considerably more skeptical of the claims of industry than were its scientists, but were able to provide a forum (the hearing process) for articulation of contrary viewpoints. As a result, the approach of limiting false negatives advocated by the EPA and environmentalists was adopted, and the substances were treated as carcinogenic.[196]

In Britain, exactly the opposite conclusion was reached — by the Ministry of Agriculture, Fisheries and Food, which obviously has an interest in maximizing agricultural production. Its principal source of scientific advice is an appointed advisory committee, and its mode of regulation involves negotiations "conducted within the framework of a voluntary (that is, non-statutory) agreement between government and industry — the Pesticide Safety Precautions Scheme."[197] The effect of the Ministry's concern with agricultural production on its policy orientation is reinforced both by the interactions of industry with the advisory committee, and by the "traditional requirements of scientific causality" with their emphasis on limiting false positives.[198] Conversely, there existed no forum in which an alternative approach to Aldrin and Dieldrin could be articulated, nor was it clear that there was anyone there to articulate it, perhaps because the closed nature of such processes tends to discourage the development of this capability.[199]

The structure of the decision-making process, then, can have a significant effect on how scientific uncertainty is dealt with. The relevance for Canada is obvious, since the regulatory process here is similar to the British model both in general terms (parliamentary government) and in specifics such as the entrusting of pesticide regulation to a department with other, potentially conflicting mandates. And access to the decision-making process is conferred, not by statute, but by administrative discretion, financing and organization, and general perceived legitimacy.

There are limits to the use of process as an explanatory variable, of course. The regulatory delay and implicit balancing of hazard creation and economic consequences evident in jurisdictions like the United States[200] with a far more open regulatory process, suggest that other factors are also involved. One such factor is the limited extent to which governments' role in promoting economic development allows overt conflict with the private sector of the kind that would inevitably be provoked, for example, by tighter controls over budworm spraying in the Atlantic provinces. A more open decision-making process does not itself reduce industry influence, but only provides a modicum of access to information and an opportunity to articulate alternative viewpoints. And scientists themselves have often been slow to appreciate the normative content of the use of science in public policy. Some observers note an active hostility among many scientists toward "unscientific" bases for decisions.[201]

All that is really being said here, however, is that the treatment of scientific evidence invariably entails important value judgments, and that they should be made explicit. This being said, the problem remains of how to resolve the tradeoffs and conflicts which are inevitable, given the practical impossibility of attempting to eliminate all potential hazards. Not only in environmental hazard policy, but in many other areas of policy analysis, the dominant conceptual framework for resolving such conflicts has been provided by the discipline of economics. Yet, as argued in the next chapter, economics can easily conceal more than it reveals about the nature of the decisions being made.

CHAPTER THREE

The Limits of Economic Analysis

I. Economics as "Conceptual Lens"

Recent discussion of environmental hazard policy, at least in North America, has been dominated by the discipline of economics, and the activity of economists. Economists frequently imply, if they do not state, that economics is a uniquely appropriate method for determining the proper objectives of public policy, and are often at pains to contrast their supposedly precise and scientific conclusions with the less scientific, less "rational" outputs of the political process.

However, economics comprises a system of methodologies and assumptions which functions as a set of "conceptual lenses."[202] When a particular issue, like protecting workers from cancers induced by the chemicals they handle, is viewed through these lenses, some aspects of the problem appear far more significant than others. Viewed through a different set of lenses, the issue may suggest a different set of responses. Even the way "the problem" is defined will probably change. Yet far from being uniquely appropriate, the application of economic theory to problems of environmental hazard policy embodies a number of important epistemological and ethical judgments which, it is here argued, would be the subject of considerable controversy were they to be made explicit.

II. Externalities, Markets, and "Efficiency"

A. Externalities

A factory producing goods for sale cannot operate without purchasing inputs such as raw materials, machinery and labour. All these represent costs of production which the firm cannot avoid incorporating in product prices — at least, not for long. That is, they are "private costs." But the production process may also involve "public costs" which are not reflected in pricing. Air pollution from the plant may corrode the paint on people's cars or houses, give them coughing fits or cancer, or contribute to the acidification of lakes hundreds of kilometres away. Water pollution may mean a downstream municipality has to upgrade the treatment of drinking water for its residents; that fish die off (and with them tourist industries or commercial fisheries); or that a river which was once clean and pleasant becomes murky and malodorous. Toxic wastes which have been buried without proper precautions may contaminate groundwater or may surface years later to affect the health of area residents.

Economists refer to such an effect as a negative externality[203] — that is to say:

> ...an effect of economic activity that lies outside the normal control of market processes. For example, people exposed to the effects of air pollution caused by the industrial production of goods made and sold for profit, have no recourse through the market to obtain financial compensation. This would not be the case if people owned a marketable right to clean air since, under those circumstances, industrialists wishing to pollute the air in their quest for profit would have to buy the right to do so in the same way as they must buy the right to use the other resources that are necessary for production.[204]

Modern industrial economies operate on the basis of tremendously large flows of materials, which have to go somewhere. Much of this throughput ultimately ends up as "residuals" — waste of one form or another.[205] The absence of property rights in the environment which must be purchased by polluters means that the use of the environment for purposes of disposing of residuals — be they airborne contaminants, liquid effluents, or buried chemical wastes — carries no price. It is a "free good."

In the absence of government intervention or a change in the system of property rights, a profit-oriented firm will have no economic motive to reduce pollution or other negative externalities unless this reduction can be accomplished in a way which provides a return comparable to that which could be earned on alternative investments. The firm will also have a strong economic motive to resist attempts to force it to internalize such costs, for instance, by spending money on new pollution control technology.[206] This analysis also suggests that arguments about the adverse effects of environmental hazard regulation on "productivity" are missing a crucial, although politically important, point. Hazard reduction amounts to a decision to shift some activity away from producing marketable outputs (on the basis of which productivity is measured) toward producing non-market "goods" such as reduced pollution or safer workplaces.

Other things being equal, therefore, a reduction in measured productivity is exactly what one would expect as the result of such regulation.[207]

Virtually all governmental efforts to control environmental pollution through public policy are attempts to price the use of the environment, either directly or indirectly. Regulations backed by penalties, often distinguished by policy analysts from more explicit pricing mechanisms, are as Dewees observes merely "a special kind of pricing. If pollution above a certain level is prohibited, with a fine for violation, then the price of polluting is zero up to that level, and a fixed amount for any excess."[208] The amount is, of course, not fixed, but determined by the courts only after successful detection and prosecution. The low likelihood that violations will be sanctioned makes it likely that, in practice, the price will often continue to be zero, but the principle remains.

Many of the textbook examples of negative externalities resulting from pollution involve losses of amenity (the reduced recreational attractiveness of watercourses) or property damages which can be unequivocally valued and directly compensated (pollution which soils laundry on the line; sparks from a passing train which ignite a farmer's crops).[209] But the environmental externalities of contemporary concern tend to involve effects on human life and health,[210] or complex and often unpredictable effects on entire ecosystems. Just a few illustrative examples include the relationship between urban air pollution and increased incidence of (and mortality from) respiratory illness;[211] the widespread diffusion of acknowledged carcinogens like asbestos and benzene;[212] and the adverse impacts on learning ability and behaviour in children which appear to result from lead exposure in urban areas.[213]

Dirty laundry, burnt crops and fouled swimming holes are easier to value and (often) to "repair" than life and health. They are also, as a rule, immediately and simply detected. Exposure to many hazardous pollutants may take place unbeknownst to the victims until and unless exposures are high enough to cause acute as well as chronic effects (as at Love Canal,[214] or in the case of workers with the pesticide Kepone who often developed "Kepone shakes" within a few weeks of initial exposure[215]). Even in these cases, the victims may not be fully aware of potential long-term effects: cancer, damage to the reproductive system, or increased likelihood of premature mortality from respiratory disease may be observable only years or decades after initial exposure.

Many of the usual examples also involve a single identifiable source, or a limited number of identifiable point sources and identifiable damaged individuals. Some real-world examples roughly correspond to this model: the pollution of the English-Wabigoon river system by Reed Paper;[216] emissions of arsenic from gold-roasting operations in Yellowknife;[217] and the vegetation-killing plume of emissions from Algoma Steel.[218] Many other hazards involve a large number of sources, identifiable with difficulty if at all. Examples include the hundreds of synthetic organic chemicals detected in the Great Lakes;[219] groundwater contamination from multiple sources;[220] and urban storm water runoff, which has been found to contain 1000 times as much lead as effluent from a secondary sewage treatment plant.[221]

Parenthetically, these considerations radically limit the usefulness of civil suits as a way of forcing the internalization of costs, whether through the awarding of compensation or through injunctive relief. Other barriers include (but are not limited to) the problematic nature of standing to sue as one of a class of victims (or alternatively, the prohibitive costs of finding and organizing all the victims).[222] Often, environmental plaintiffs must show that harm has already occured, and have difficulty meeting legal standards of proof in linking damage to particular contaminants from a specific sources.[223] Judges may lack understanding of environmental issues, and have, at least on occasion, been distinctly unsympathetic.[224] Business defendants have financial resources vastly superior to those of plaintiffs.[225] And at least occasionally, court decisions favourable to Canadian environmental plaintiffs have been nullified by legislative action.[226]

The pervasiveness of the externalities generated by industrial production (and consumption) means that public policy cannot aim to eliminate them all. This does not mean that a case cannot be made that all discharges of particular hazardous pollutants should be eliminated if the pollutants tend to accumulate in the environment without degrading, or if the potential damages are large (or uncertain) enough.[227] Economists studying environmental pollution, and for that matter consumer product hazards and workplace health and safety, normally answer the question of *how much* pollution reduction is desirable with reference to the criterion of efficiency. But the term has a rather specialized meaning in their lexicon, despite its apparent neutrality.

B. The Concept of Efficiency

The conceptual basis of efficiency, as the term is used in assessing the outcomes of public policies, is a state of affairs known as a Pareto optimum. Its definition, and its central role in economic and political thought, have been succinctly summarized by Rescher:

> Definition: One distribution of utility to the members of a society is a "Pareto improvement" upon another if it is such that some fare better and none fare worse.

> Definition: A distribution is "Pareto optimal" within a range of alternatives if it represents Pareto improvement over every other member of this set.
>
> Thesis: Whenever one alternative represents an overall distribution of utilities to the members of a society that is Pareto optimal within a set of its rivals, then the "socially rational" thing to do is to prefer this alternative over the rest.[228]

But how are "welfare," or "utility," to be defined? This debate, which in its more general form has occupied utilitarian philosophers for a long time, is resolved by the market's role as an allocator of resources. Markets (it is argued) allow all participants to define welfare on the basis of their own preferences, and to articulate these preferences on the basis of their willingness to pay to satisfy those preferences. Individuals will purchase a good or service, whatever it may be, only if it is worth more to them than any alternative purchase or combination of purchases:

> [A]n exchange takes place only when both parties feel they benefit by it. When no additional exchanges can be made, the economy has reached a situation where each individual in it cannot improve his own situation without damaging that of another... When no one can be made better off without someone else being worse off, Pareto optimality has been reached. In economic parlance this situation is called "efficient."[229]

Underlying the use of efficiency or welfare-maximization as a normative framework is a more or less clearly defined philosophical concept of "economic man," a being whose principal motivation is the maximization of welfare in market transactions; whose level of well-being is viewed as a product of his ability to do so; and whose "rationality" is often judged on the basis of the consistency of this behaviour.[230] A bizarre and extreme manifestation of this vision of human nature is that some economists appear to assess the importance of saving or prolonging life principally in terms of the additional "opportunities for consumption" provided.[231]

Markets do not ordinarily exist for environmental quality, nor for any number of other "public goods" which may be important potential contributors to welfare. And situations in which no one is made any worse off (by any definition of utility) are rather uncommon in the real world of public policy — in part at least, precisely because there are many kinds of "goods" which are not traded on markets. The response of welfare economists and policy analysts has been to evaluate competing policy alternatives on the basis of *potential* Pareto improvements. This criterion, known as the Kaldor-Hicks principle after its originators, requires only that *aggregate* welfare/utility gains outweigh aggregate losses. This is measured for theoretical purposes by the ability of "gainers" to compensate "losers," but the principle does not, as used in contemporary welfare economics, require that compensation actually be paid.[232]

As applied to environmental pollution, this criterion dictates that "[a] negative externality should not be removed altogether. Instead, the aim should be to secure the *optimal amount of externality*."[233] In other words, pollution should be abated to the point where the sum of the costs of pollution abatement and of the damage done by the remaining externality is minimized; the next increment of environmental improvement "purchases" through installing additional pollution control devices will cost more than it is worth in terms of the value of damage reduction. At this point:

> [D]espite passionate prose to the contrary, society will lose less, or gain more, if it puts [the remaining] waste in the river and takes the money (land, labor and capital) it would have spent treating these units of waste and devotes it to building hospitals, homes, and hula-hoop factories, or whatever people indicate they prefer by their spending habits.[234]

Assessing environmental hazard policy in terms of efficiency implies some way of ascertaining what the outcome would be of a market in which improved environmental quality could be bought and sold. When the point is to achieve a stated reduction in pollution at lowest cost (that is, most efficiently), policies have been proposed which would actually create a market for the use of the environment, for instance through the creation of marketable pollution rights, or which would simulate the effects of a market on producers by imposing charges for each unit of contaminant emitted.[235] This use of the efficiency criterion as a method of evaluating alternative ways of reaching a given policy objective raises relatively few philosophical problems, and is not discussed further in this Paper. When efficiency is to be used in selecting objectives, market outcomes are approximated through the technique of cost-benefit analysis, examined in more detail in the next section of the chapter.

When we select policy objectives, whether with respect to environmental quality or other issues, on the basis of the efficiency criterion, we are saying: (1) that we would be satisfied with the outcomes of markets for such amenities as environmental quality, if such markets could be established, and related to this (2) that no reductions in welfare, for example those entailed by reduced environmental quality, are incompensable. Any deterioration of environmental quality, even if it results in serious or life-threatening health effects, is compensable by some increase in the available stock of hospitals, homes, or hula hoops.

Neither point is self-evident. We tend to be very uneasy about the implications of using "pure" markets to allocate military service, scarce and expensive medical treatment, or other such items.[236] This is largely because any resource allocation resulting from a market outcome inevitably reflects the existing distribution of wealth. Whether the "good" in question is diamonds, food, or the freedom from toxic contaminants in the atmosphere, "willingness to pay" in a market setting, real or hypothetical, is irrelevant unless backed by ability to pay. This reflects a more general problem with efficiency: the concept pays no attention to the distribution of welfare.

It is possible to get around this problem if we do not consider the present distribution of wealth to be ideal or legitimate, by applying efficiency as a criterion in conjunction with other criteria of distributive legitimacy, or hypothesizing the results of a market given, for example, a more equal distribution of wealth than that now in existence. The resulting outcome, however, will be *inefficient* in terms of the *present* distribution of resources. Thus, if we believe present distributions of resources (or changes in that distribution resulting from the particular policy or action being assessed) to be inequitable, there is a direct conflict between equity and efficiency. When economists argue that policy evaluation should pay more attention to efficiency, the parallel contention that less attention should be paid to equity is often present, at least by implication.

It is harder to get around a more general objection to efficiency as a basis for making policy choices: are there some "goods" which we feel people *should not have to purchase* — access to which, that is to say, should not be conditional on ability to pay, or on willingness to exchange them for a reduction in other aspects of welfare?

The implications of the premise that all losses are compensable were dramatized in the early 1970s by Ford Motor Company's argument that the $11-per-vehicle cost of meeting a proposed U.S. standard for fuel tank leakage in rollover accidents was unjustified on the basis of the benefits of the standard — estimated as the elimination of 180 burn deaths a year, 180 serious burn injuries, and the destruction of 2,100 cars a year in accidents. The value of a life saved was taken to be $200,000; of a serious burn injury, $67,000; and of the damage to vehicles, $700 per car. Applying these values to the estimated effects of the standard produced a total annual benefit valuation of $49.5 million — far less than the projected annual cost of meeting the standard ($137 million).[237]

The issues took on flesh because it came to light later in the decade that, in addition to making this academic argument, Ford had rejected (on cost grounds) a number of inexpensive design changes to its Pinto and Bobcat models which would have provided far superior occupant protection against accident-related fuel tank fires. Ford had, according to evidence in civil and criminal proceedings arising from fatal Pinto/Bobcat accidents, known about the potential hazard for several years.[238] Although Ford's action was clearly motivated by a desire to reduce its own costs and increase profits, it could equally well have been justified as maximizing aggregate welfare!

Perhaps the dollar values estimated for avoidance of burn deaths and mutilations were too low. (Ironically, the figures Ford used were ones used by the U.S. National Highway Traffic Safety Administration.[239]) Perhaps more deaths and mutilations would have been avoided than Ford's analysts projected. But are these the points we really care about?

III. Cost-Benefit Analysis

Cost-benefit analysis (CBA) represents the application of the criterion of potential Pareto improvement to the evaluation of public policy alternatives:[240] a policy should be implemented only if its aggregate benefits exceed aggregate costs. Cost-benefit analysis of new regulations to control environmental hazards is required by Executive Order in the United States,[241] and is a preferred method of conducting the SEIA required of new federal regulations in Canada since 1978.[242]

Despite such seemingly extreme and uncritical applications of CBA as Ford's, the theoretical rationale appears at first to be unexceptionable:

> Resources are mobilized to solve a problem — cotton dust, ozone, or head-on automobile collisions. These resources could be used to produce other goods and services; therefore, regulation has a cost. Hopefully, we can find a set of alternative policies which will reduce the ill-effects of exposure to these health- or life-threatening phenomena. As rational human beings we should compare the benefits from such policies with their resource costs. Cost-benefit analysis is simply a phrase describing this comparison.[243]

Yet applying CBA to environmental hazard policy is dogged by numerous practical difficulties, as well as by the fact that its use as a decision rule represents a set of (usually unstated) resolutions of the normative issues raised by the efficiency criterion itself.

A. Cost-Benefit Analysis: Practical Uncertainties

In determining the costs of measures to reduce environmental hazards, analysts will depend heavily on industry-supplied data on costs and technological options.[244] Early industry estimates of the cost of complying with the *U. S. Toxic Substances Control Act* (TSCA) were as much as an order of magnitude higher than U.S. government estimates.[245] In a case where industry's protestations were ignored (that of the American workplace exposure standard for vinyl chloride), compliance costs initially estimated in the billions of dollars turned out to be only $300 million, and the largest producer was able to market its exposure-reducing technology under licence to other manufacturers.[246]

A 1980 U.S. study of the costs of environmental regulation found that before-the-fact compliance cost estimates by both industry and regulators, even where the technology was specified, varied from 0.51 to 3.47 times actual compliance costs.[247] The general lesson may be only that before-the-fact cost estimates are unreliable, whoever is providing them. However, any CBA of environmental hazard control options based on the performance of present-day technologies will have a built-in bias which all but precludes a technology-forcing role for regulation or other sanctions.[248]

The relevant costs for purposes of CBA include not only compliance expenditures but also opportunity costs — that is, the return which has been foregone by using resources in ways which do not produce goods and services for sale on the market.[249] Thus a cost-benefit analysis of proposals to reduce pollution or limit worker exposure to carcinogens properly evaluates their cost on the basis of the return a producer could earn by using the money to expand the plant, increase production volumes or develop a new, improved, more saleable product instead of using it to cut emissions or enclose production processes.

This aspect of CBA is seldom considered, but it is particularly important. Weidenbaum justifies his (and industry's) opposition to "excessive" government regulation on the basis of costs such as:

> [t]he new investments in plant and equipment that are not made because over one-tenth of the funds must be diverted to meeting government-mandated social requirements

and

> ...the factories that are not built, the jobs that do not get created, the goods and services that do not get produced, and the incomes that are not generated.[250]

On a practical level, this implies a preference for marketed goods and services as distinct from non-marketed amenities; the costs of compliance expenditures and foregone output will always look more "real" than the hypothetically valued benefits.[251] Since in a free-enterprise or mixed economy "productive" uses à la Weidenbaum are also profitable uses, the rationale for industry's support of CBA of new regulations is obvious. The preference accorded to marketed outputs is reinforced by some analysts' definition of the objectives of CBA in terms of maximizing welfare as defined by GNP.[252] This perspective, in turn, implies at least a general commitment to wealth-maximization (again without specific consideration of distribution) as a goal of public policy if not an ethical imperative. Some commentators are quite explicit in defence of wealth-maximization as an ethical principle,[253]but more often it remains unstated.

For purposes of CBA the benefits of public policies must be determined, and a value assessed for comparison with the costs of the policy in question. Two distinct stages can be distinguished in assessing benefits for CBA: estimating the benefits of a proposed policy (in terms of reduction of death, injuries, illness, vegetation damage, and so forth); and, attaching a dollar value to the resulting reduction.

Fatal uncertainties exist at both stages. An extensive recent review of research on the benefits of health and safety regulation isolated several areas of scientific uncertainty or conflict: the demonstration of cause-effect relationships; limited availability of epidemiological data linking exposures with actual human illness; the limitations of models used to predict dispersion of pollutants within the environment; dose-response relationships; the validity of interspecies extrapolation; and the extent of impacts on especially sensitive individuals or groups.[254]

Information in at least some of these categories is normally essential in estimating the damage done by a contaminant — and, hence, the benefits of reducing emissions or exposure. As noted in Chapter Two, the resolution of "scientific" uncertainty in a number of these areas, on the basis of almost inevitably incomplete knowledge, involves conflicting viewpoints about how uncertainty should be weighted in choosing from among a wide range of defensible values. The resulting choices in any specific case are exogenous to, and independent from, economic analysis of controlling the hazard — yet they will fundamentally influence the resulting benefit-cost ratio. So too, will the assessment of the effectiveness of a particular control measure in reducing the hazard in question — itself often a field of controversy, as illustrated by discussions of the contribution of different sources in Canada and the United States to the acid rain problem,[255] and — to take an example from the consumer product field — the effectiveness of active and passive occupant restraints in preventing automobile crash injuries.[256]

It may be unrealistic to expect "more research" to provide better benefit estimates in many such cases.

> Decisions are often made in a context of limited knowledge about potential social or environmental impacts... . Thus power hinges on the ability to manipulate knowledge ... and technical expertise becomes a resource exploited by all parties to justify their political and economic views.[257]

Yet waiting for more research does not avoid the issue. Benefit estimates for use in policy assessment must be made on the basis of the available evidence.

Once benefits are estimated, a value must be attached to them, defined in terms of how much people would be willing to pay for them *if* the benefits were marketed.[258] This gives rise to the most often cited problem of CBA, the need to assign dollar values to benefits which are not normally, or cannot be, the subject of market transactions. In contexts not directly involving health-related benefits, this has been done, for example, by estimating the relationship between pollution levels and property values. The difference in property values between high- and low-pollution areas serves as a proxy for the amount people are willing to pay for a cleaner environment.[259] In other cases, the value of recreational opportunities provided, preserved or foregone, has been inferred from the time and money people are willing to spend to take advantage of them.[260]

Such inferences contain their own political biases. An inverse correlation is often observed between income and exposure to urban air pollution.[261] This can be interpreted in terms of "willingness to pay" for cleaner air; alternatively, one can observe that the poor are not unwilling to pay, but are victimized by their inability to pay: the people who cannot afford to move out of high-pollution areas are the ones who stay there.

> The logical and practical result of using willingness to pay as a criterion would be that public parks or clean air in the ghetto sections of a large city would yield a lower benefit-cost ratio than the marina for top management personnel. A mode of reasoning which leads to or indirectly supports such an outcome reveals its hidden, basically unequalitarian value judgments inherent in the compensation principle as a criterion of evaluating the "worth" of environmental goals.[262]

The disquieting implications of assigning dollar valuations to benefits are clearest when we have to place a value on life and health (or on avoiding death and suffering). An extensive literature has built up around valuation of life, an issue which is normally approached in one of two ways. One approach simply equates the value of any individual's life with the discounted present value of his/her future earnings.[263] Consequently, men's lives are worth 50 per cent more than women's, children's lives are worth less than those of young adults and middle-aged people (because of the effect of discounting on nominally larger, but more remote, future earnings), and the life of an 85-year-old nonwhite American woman, in 1972, was worth US $ 128.[264]

Perhaps it is not surprising that many analysts have serious doubts about the discounted-future-earnings approach.[265] The alternatives involve either asking people directly how much they would pay to avoid particular fatal outcomes, or inferring from the amounts people spend (for example, on smoke detectors) or "demand" to be paid (for example, as compensation for additional hazards in the workplace) the value they place on their lives. From these data, a valuation of incremental increases in life-expectancy is inferred. Such methods are generically described as willingness-to-pay approaches and sometimes further divided into approaches relying on "expressed" and "revealed" preferences; they tend to generate dollar values for life considerably higher than those produced on the basis of the discounted future earnings approach.[266] They all imply that the particular policy in question should be evaluated on the basis of (real or hypothesized) individual willingness to pay to avoid an increase in the probability of death, or a probable reduction in life span.

The value assigned to a life saved in various studies, whatever approach to valuation used, has varied only by about one order of magnitude — leading Graham and Vaupel to conclude that the difference in dollar values assigned to life will seldom change the outcome of a CBA of a government program or regulation whose objective is protecting health and safety.[267] The principal importance of looking at the value-of-life debate may therefore be not practical, but heuristic: it illustrates what it means to make policy on the basis that all gains and losses are commensurable.

Valuing illness, injury and suffering raises similarly intractable questions. One proposed approach attaches a value to illness and injury avoidance based on "(1) pain; (2) cosmetic losses; (3) inability to allocate time in the most preferred manner." Cosmetic losses, such as facial disfigurement, would be valued by estimating the "implicit price of personal attractiveness" based on "expenditures wholly designed to increase one's own attractiveness."[268]

The process gets even stranger because of the standard practice of reducing the value of future benefits by a specified discount rate to arrive at a present value, on the grounds that the resources invested in securing these benefits could otherwise have been earning a return in some alternative use.[269] Thus extremely unpleasant, but distant, consequences do not look very important once their dollar value is discounted to arrive at the present value of avoiding future disaster.[270] Ashford observes in this context that:

> For example, an asbestos-using firm may either install a ventilation system today to get rid of asbestos or instead pay compensation costs thirty years from now when a worker develops cancer. What should the "rational" owner of a firm do? The owner can have the use of his money for thirty years, send a worker's children to school, bury him in a gold coffin, and still be ahead financially.[271]

The problem can be gotten around, of course, by specifying an extremely low or zero discount rate. Some economists have argued strongly for this approach in cases where major but uncertain (and potentially irreversible) health or ecological impacts are involved.[272] Others disagree, arguing that discounting reflects only "the opportunity to forego investments far in advance of the life to be saved in order to have more resources available closer to the time at which the life is actually lived."[273] Like many other aspects of benefit estimation and valuation, selection of a discount rate is a value-laden and far from "objective" choice; it is one exogenous to, and independent of, the analytical technique; yet it can be crucial in determining the calculated cost-benefit ratio.

A defender of CBA might object that many of the uncertainties discussed in the previous pages are dealt with in any serious application of CBA through the use of sensitivity analyses, which indicate how alterations in any important parameter (such as the value of life, the number of fatal cancers to be prevented, or the rate at which future benefits are discounted) will affect the outcome of the analysis. He/she might further comment that cost-benefit ratios calculated using a range of values might be a useful way of determining how scientific uncertainties should be resolved — for instance, if the costs of control are alleged to be so high that even the most optimistic assumptions about benefits or the highest life valuations do not appear to justify controlling the hazard in question.

However many parameters may be varied for purposes of sensitivity analysis, CBA still *cannot* address two crucial questions. First, if not all possible combinations of parameters yield the same qualitative result (a positive or negative cost-benefit ratio), the outcome of the analysis may be crucially dependent on value judgments external to the analysis and on questions of process.

Second, whatever the results of the CBA, is it — in Kapp's terminology — "cognitively responsible"[274] to make decisions about the level and distribution of longevity and health on the basis of the efficiency criterion and on the basis of hypothesized market values for life, bodily damage and suffering?

B. Risks, Rights, and Cost-Benefit Analysis

As observed earlier, the essence of CBA is that it attempts to simulate a market for non-marketed values. In an actual market, *existing* distributions not only of wealth but also of property rights are crucially important.[275] For example, the amount of wealth you possess will probably affect the price you ask for your house. Yet if you consider your home priceless, you can always (except under the threat of expropriation, of course), refuse to sell it, whatever an economist's opinion of its fair market value. Similarly, if property rights in the environment were initially assigned either individually or collectively to those who wish to use it for purposes other than waste disposal, a single individual or group of individuals could frustrate a polluter's plans to discharge a particular substance into a particular air- or watershed simply by refusing to sell the firm in question the right to do so.

In practice, property rights have been assigned in the reverse manner: it has been assumed that polluters are entitled to use the environment for residuals disposal until and unless a strong case can be made for restricting that entitlement. One factor in that assignment is the difference among various uses which can be made of the environment. As Krier elegantly points out:

> Essentially two classes of demands can be made on such resources as air, land, water, wildlife and so on: (1) demands which consume or deteriorate those resources (water pollution, the slaughter of wildlife, the harvesting of forests) (2) demands which *do not* consume or deteriorate them (swimming, birdwatching, hiking and camping)..... [C]onsuming users, by exercising their demands, can foreclose nonconsuming users from exercising theirs, while the contrary cannot hold true.[276]

Using CBA as the basis for decision making reinforces a particular *de facto* allocation of property rights. Lovins provides a concrete example of how this process works: when many people responded to a survey question by answering that no amount of money would compensate them for the expropriation of their houses to build a new airport, a British commission of inquiry assigned the value of three times the market value of the house for purposes of CBA.[277] People are, in essence, told rather than asked their asking price — a procedure which, if used as the basis for public policy, is a travesty of the "free" market: "It is an essential feature of such a market that any party is free not to reach agreement."[278]

This assignment (or appropriation) of property rights extends to judgments about the acceptable level of endangerment of life and health, as a result of CBA or for that matter of a number of similar approaches to determining "acceptable risk." The individuals potentially endangered cannot "refuse to sell." Bogen's insightful discussion of "benevolently imposed (BENIM) risks" sums up this issue extremely well:

> [T]he valuation of life in terms of BENIM risk-benefit balancing goes farther than merely placing life on the market, it perforce places *all* lives on the market — in effect, transforming life into currency or legal tender which society is of right free to collect, like taxes, in order to pay off its technological debts.[279]

Are we satisfied that benefit valuations capture (for instance) all the essential dimensions of the "losses" caused by disfigurement resulting either from a street attack or from the design of a consumer product? If not, it is probably because dollar valuations cannot capture or comprehend precisely "that cost which is socially the most significant — the *unwantedness* of involuntary, unjustified deprivations of well-being at the hands of another."[280]

Sagoff has criticized the use of CBA on another set of grounds, arguing that a difference may well exist between our willingness to pay as individual consumers, and our willingness to make decisions incurring a collective obligation (for instance, preserving wilderness) *as citizens*. In his view, the role of public policy as a vehicle for the articulation of collective choices must be separated from the (real or hypothesized) decisions of individuals as consumers. It is surely a tenable hypothesis that there may be objectives which individuals as members of a community wish to pursue (for example, protecting their own number from being poisoned in the course of earning a livelihood, or from any number of other insults to life and personal integrity) quite apart from considerations of the willingness and ability of any individual or set of individuals to pay for that protection.[281]

C. CBA or Chaos?

Much of CBA's superficial credibility stems from its aura of common sense. Would *we*, as a society, want to make decisions that cost more than they are worth? Many economists argue that CBA is indeed the only, or at least the only sensible way of making decisions about environmental hazards: "the excuse for avoiding cost-benefit analysis is likely to be one which argues strongly against ... using any decision-making tool other than the rolling of dice."[282]

This claim does not stand up to even cursory scrutiny. CBA can only be performed on the basis of a number of essentially political and ethical decisions or non-decisions. Many of them are external to the actual process of doing a cost-benefit analysis, but without them the process cannot proceed. The effect is to generate a neutral-appearing result on the basis of a thoroughly *non*-neutral set of assumptions and presuppositions. These include not only those on the basis of which the parameters which serve as data for the CBA are arrived at but also the justification for doing cost-benefit analysis in the first place: the premise that efficiency is the relevant (or even a relevant) criterion for assessing policy objectives.

Recognizing the problems associated with reliably or even intelligibly assigning dollar values to all costs and benefits, some defenders of CBA claim that it is not concerned so much with valuing all possible impacts as simply with identifying them;[283] and that dollar values need not be attached to such benefits as reduced mortality or improved health.

Within the theoretical framework of welfare economics, this "weak version" of CBA makes little sense: if values are not quoted in dollars (or in some other "common denominator"), how can one possibly hypothesize the results of a market? In this version, CBA appears to mean only that some comparison is to be made of the adverse and beneficial aspects of a proposed policy. But who is to make the comparison? How is it to be made? And who is to decide whether a given impact is adverse or beneficial?

This last point is by no means an idle question. Weidenbaum decries the fact that health and safety regulation has induced a shift away from productive investment, as judged by its contribution to GNP. Yet Ashford argues that such regulation is important precisely because of its function of "giving signals to industry" that it must reduce the extent to which it imposes hazards on citizens.[284]

This observation leads to a general conclusion about decision making for environmental hazard policy, which is pursued in Chapter Five. The quality, legitimacy or justifiability of a decision need not be a function solely, or even principally, of the substantive decision rule (or set of rules) by which it was reached.[285] The criminal justice system and the way in which laws are made in most "democratic" countries illustrate that the quality of many kinds of decision is inseparable from the integrity and balance of the *process* by which they are reached. In its strong version, CBA can conceal both self-interested selection of benefit estimates and valuations,[286] and underlying ethical/political non-decisions about rights and distribution of resources. And in its weak version, the outcome of CBA would appear totally dependent on considerations of process.

It is possible, in principle, to combine the use of a CBA in decision making with a highly open, balanced, and accessible process. Some analysts have suggested this as a way of making CBA-based decision making more scrutable and less susceptible to manipulation.[287] But it would appear that the merits of such a procedure derive entirely from the open and accessible nature of the decision-making process, rather than from the worth of the particular kinds of information provided by CBA.

IV. Worker and Consumer Protection: "Choice" as Ideology

The toll taken by job-related illness and injury is an obvious side-effect of economic activity. But since workers are compensated for their labour, it is superficially plausible to claim that job-related illness and injury are "compensated risks" — compensated on the basis of the workings of the labour market.[288] As this argument runs:

> [A] rational worker would be expected to evaluate the risks associated with any particular type of employment, and only *offer to work* at that type of employment if an adequate wage differential was offered to compensate for risk.[289] [Emphasis added]

Managers would, in turn, weigh workers' assessments of the value of safety (as evidenced by wage "demands") against the costs of eliminating or reducing workplace hazards. The result would be a selling price for goods and services, and a level of workplace health and safety, which represented an efficient allocation of resources among workers' demands for health and safety and all other goods and services.

Some studies suggest the existence of wage differentials among jobs which reflect the relatively more hazardous nature of some occupations;[290] it might therefore be argued that the degree of hazard protection afforded to workers in relatively less dangerous jobs is a function of their willingness to pay (in the form of lower wages) for increased safety. However, the *adequacy* of compensation provided by "risk premia," even without arguing about whether or not workers should have to make such tradeoffs as the price of employment, is questionable for a number of reasons.[291]

The most basic of these is information: for markets to determine the proper level of work hazard, a worker should be aware of the existence, duration, and intensity of exposure to all potential hazards, and of their potential effects. In some cases, of course, workers are well aware of the health dangers of their work. But the sheer number of possible hazards makes obtaining the information needed for informed choice an overwhelming and ultimately, impossible task.[292]

Industry has often denied access to information such as the composition of chemicals to which workers are exposed, and the hazards which this exposure may entail.[293] As Reschenthaler points out, this is to be expected: in any situation where labour prices might be raised by workers' knowledge of potential hazards, industry has a strong vested interest in concealing information about workplace hazards or minimizing their significance.[294] Public policy has often protected industry's prerogatives in this respect.[295] Unions can and do, of course, take an active role in trying to inform their members about workplace hazards. However, workers probably have enough information to "price" job-related risks properly only when unions are strong or where mass media coverage of the hazard in question has been extensive.

Even given full information, there may not be much workers could do with it. Workers' skills, geographic locations, age, and many other factors drastically reduce their available options. Roughly a tenth of Canada's population live in single-sector communities — one-industry, if not one-company, towns.[296] Alternative employment for a uranium miner or pulp mill worker in northern Ontario, an asbestos miner in Thetford Mines, Québec, or a logger in British Columbia may be extremely hard to find. Employers who are major sources of livelihood in a region may well use that status to reduce or eliminate risk premia, and to impose a peculiarly unattractive set of tradeoffs ("your job or your life") on workers, as on their communities.

These and other, more general constraints are succinctly summarized by MacCarthy:

> [E]xposure to occupational hazards is, by and large, involuntary. For most people in our society, work is unavoidable. If individual workers find themselves facing unacceptable occupational risks, they cannot simply withdraw from the market. They must choose among available occupations — and so some must accept risky jobs. This does not mean that workers are coerced into accepting risky jobs in the same way that draftees are. But external conditions frequently limit options so severely that coercion is not needed.[297]

A defender of the notion that labour markets are sufficiently "free" to merit the attachment of any legitimacy to their allocations of occupational hazard levels might argue that such constraints only show that workers' ability to pay for hazard reduction, like everyone else's, is limited. This argument clearly assumes the legitimacy of the existing distribution of resources, as do similar market-based arguments in other contexts. It also ignores the inequality of the employer-employee relationship: given our existing system of property rights, one party has an inherently greater ability to determine the options available to the other. And it also, of course, still does not address the issue of whether workers *should* have to pay for safety on the job.

In the case of consumer product hazards, the problems of obtaining the information needed for informed choice may be even greater. An individual consumer could devote a great deal of time to acquiring expertise on, for example, automobiles or food additives. But this expertise must inevitably be obtained at the cost of ignorance of other possible hazards, especially those (such as asbestos in hair dryers or allergenic and possibly carcinogenic emissions from home insulation) which do not immediately suggest themselves.[298]

Firsthand information about product hazards may be available only at very high cost, and after purchase (as in the case of defective tires or automobile fuel tanks). The latent nature of other hazards such as toxic substances means that the information needed to alter purchasing patterns (for example, on the basis that Soap X is carcinogenic) cannot be obtained unless some group or agency (usually government) has initiated the process of discovery, and made public the results. The consumer him/herself cannot make the necessary tests.

The difficulty of obtaining information would be regarded by economists as a transaction cost. Transaction costs are simply costs that have to be incurred in order to make a market transaction, or which would have to be incurred before a market could operate. According to some commentators, the existence of such costs may represent an efficient (and justifiable) state of affairs since it might cost more to eliminate the transaction costs than it would be "worth" in terms of people's willingness to pay to surmount the relevant difficulties.[299] There is an obvious conflict here between the values of efficiency and of informed choice as a desideratum for reasons independent of its contribution to the market's production of efficient outcomes. This distinction is often blurred or ignored in economists' praise of the "free" market.[300] A further point is equally important: very often, industry possesses at least some of the necessary information, but does not make it available. Thus, one set of actors (industry) can "set" transaction costs to its own advantage. We should not, consequently, be surprised at industry's frequent opposition to proposals or requirements for more extensive information release.

Regulatory indifference of the kind illustrated by the absence of testing requirements and approval processes for cosmetic ingredients in Canada,[301] by *reducing* the scope for informed choice, enhances the "technological vulnerability" of consumers. This vulnerability characterizes direct purchases of a great many products, like cosmetics, but is perhaps even more striking (and has produced some spectacular tragedies) in areas such as commercial aircraft design and prescription drugs,[302] where the science or technology is complex and where the final user/victim cannot avoid the impacts of choices made by others (for example, the airline; the physician).

Regulation to control product hazards is sometimes criticized because of the limits it allegedly places on consumer choice.[303] Yet producers, and not consumers, initially determine the limits of choice by deciding what will be produced, what product features will be available, and (absent regulatory intervention) how carefully substances will be tested and designs checked.[304] "Marketability," of course, plays a powerful role in such decisions,[305] although not always (as noted in the following chapter) in a way which gives the concept of consumer sovereignty much meaning. The nature of consumers' decisions means that (in Hirschman's widely cited terminology) they are limited to the option of "exit" rather than that of "voice."[306] They can take one of the offered options, or leave them all. By contrast, "voice" implies the ability to change the range of choices made available — an option restricted to producers, or to governments acting through the instrument of product regulation.

A similar qualitative difference can be observed between the choices available to workers in the labour market and to the firms which employ them with respect to the design and operation of the workplace; and, of course, between producing firms as consumptive users of the environment and those who use it for other purposes — fishing, swimming, drinking, breathing. Consumers may achieve a marginal degree of voice, through complaints to manufacturers, publicity, or product liability suits. Workers, as a result of union activity and legislation permitting the refusal of unsafe work, may achieve a limited degree of voice in the control of workplace hazards. But their voices, like those of pollution victims, remain severely limited and (often) contingent on shifting trends in the outcomes of litigation and regulatory policy.

CHAPTER FOUR

Business Corporations as Policy-Makers

I. The Large Corporation: Theory and Reality

The previous chapter concludes with a set of observations about the different kinds of options available to producing firms, on the one hand, and to consumers, workers and citizens exposed to environmental pollution on the other. The principles there stated hold true more or less regardless of the size of the firms in question. However, the domination of economic activity by a few large corporations operating on a national or (usually) an international scale drastically increases the practical importance of these distinctions. It also gives the firms in question additional resources sufficient to justify, if not to require, thinking about them as private governments or even "new principalities."[307]

Conventional economic wisdom is based on a hypothetical universe in which production of goods and services is carried on by a very large number of competitive firms, none large enough to influence the overall nature and conditions of the markets in which it operates. This multiplicity of producers is sufficient (in theory) to support the assumption of "consumer sovereignty" — that some producer will step in to provide products or services for which there appears to be a demand.

This picture has little connection with contemporary economic reality. Canada's Royal Commission on Corporate Concentration found that the one hundred largest non-financial corporations consistently accounted for roughly 35 per cent of all the assets of such corporations, and roughly 25 per cent of all their sales.[308] In 1979, the largest one hundred non-financial corporations in Canada generated roughly the same volume of sales as 640,000 businesses with less than $2 million in annual sales.[309] In the mid-1970s, Clement identified 113 "dominant" corporations, both financial and non-financial, with assets of more than $250 million and income of more than $50 million.[310]

In the United States, the largest 200 manufacturing firms account for approximately 60 per cent of total sales of manufactured goods, and 66 per cent of manufacturing assets.[311] And on a global level, the operating revenues of corporate behemoths like Exxon, General Motors, Mitsubishi and Unilever (in 1980, US$ 103 billion, $58 billion, $55 billion, and $24 billion respectively[312]) often dwarf the revenues of the governments, and even the GNPs of some countries, within whose borders they operate. One estimate is that transnational corporations (TNCs) account for "about one-third of the *world's* gross product."[313] [Emphasis added]

The basic point suggested by such figures is that made by Galbraith when he discusses industrial economies in terms of a dichotomy between the "planning system" and the "market system."[314] The market system, including small businesses and many agricultural producers, still operates more or less according to the model provided by classical economics. The planning system comprises both elected governments and the thousand or so major corporations which account for well over half of total economic activity. Galbraith argues persuasively that by virtue of their ability to influence their economic and political environment, rather than simply reacting to it, such large corporations have more in common with governments than with the atomistic, competitive producers whose existence is an implicit premise of much economic theory.[315]

Many markets for consumer (and capital) goods are dominated by a relatively few firms, which can (on the basis of mutual self-interest) determine and restrict the basis of competition.[316] Such large firms can also shape public preferences and values, not only as they affect the demand for particular products but (at least to some extent) with respect to more general issues.[317] And their simple size confers a great deal of flexibility, and a wide range of options, in allocating their own financial resources.

It is this ability which gives meaning to the concept of "corporate strategy." Such strategies can aim both at improving profitability and reducing risk or uncertainty (the risk-reduction component of corporate strategy is particularly emphasized by Galbraith), and one of the preconditions for effective strategy would appear to be the ability to trade off the two to some extent. Thus, obtaining important components from several different plants or suppliers (perhaps in more than one country) may slightly increase costs, but it also drastically reduces the corporation's vulnerability to price increases by suppliers or strikes by employees.[318] There are, however, serious limits to the ability of the corporation to depart from profit-oriented strategies — that is, to choose priorities other than making money or protecting its future ability to do so — over the medium or long term.[319]

Large corporations can often generate all-but-prohibitive "barriers to entry" into particular markets: for example, by maintaining intensive levels of advertising (or of research and development expenditure[320]) which few if any new entrants could afford. On a more subtle level, it has been argued that the costs of the annual style change pioneered in the 1920s by General Motors had the effect of protecting the North American automobile manufacturers against all new *domestic* entrants to their market. This protection, of course, also enabled them to define and restrict the parameters of competition within that market (to styling rather than to safety or other aspects of performance).[321]

Major firms may be able to use their financial resources to buy out "generic" competitors, as General Motors appears to have done in the case of many electrified municipal transit systems in the United States.[322] Vertical integration, another basic characteristic of large modern corporations, is typefied by the involvement of the multinational oil companies in primary production, transportation, refining and marketing,[323] but it is a far more widespread phenomenon: a steel producer may acquire control of an iron ore mine, or a computer manufacturer of a firm which produces integrated circuits. The effect is to ensure corporate control over raw material and component sources and pricing, and to reduce uncertainties for purposes of corporate planning.

Another characteristic pattern involves diversification into large numbers of unrelated areas of economic activity, often allowing the corporation to allocate resources among disparate activities in response to changes in their relative profitability or usefulness in terms of longer-term investment objectives. It is particularly (although not exclusively) in the case of such conglomerate corporations that the tendency has been observed of shutdowns of operations which are operating at a profit, yet fail to meet profit performance targets set by the corporation's head-office strategists, or fail to fit in with the corporation's longer-term plans and objectives. A few such closings may be sufficient dramatically to alter the economic base of a region.[324]

One early casualty of a realistic analysis of the large corporation and its power is the concept of consumer sovereignty in many product areas. If there are only four major manufacturers of automobiles in North America and if none of them offer lap-and-shoulder belts, integral rollover and side impact protection or anti-lock braking systems, there is very little the consumer can do about it: these are not product attributes which have been chosen as the basis for competition and promotion. The argument that:

> [T]ypically, product regulation involves areas without a perceived value to the customer. If there were a perceived value, the manufacturer would probably have brought the product to the marketplace in the form giving that value...[325]

is often insupportable because of the combination of (a) the nature of the choices available to producers, *and* (b) the concentration of the industry and the market power of its major players.

II. Corporations as Policy-Makers: Acting as Governments

A. Hazard-Creation as "Regulation"

The preceding paragraphs provide an extremely general view of the economic powers of the large corporation. But as Galbraith suggests, the economic activity of the large corporation has a political dimension as well. Perhaps the most incisive analysis of the large corporation's extensive decision-making powers as they relate to environmental hazards is provided by Nadel.[126] Like many other political scientists, Nadel defines "public policy" in terms of the authoritative and binding allocation of values for the society as a whole. He concurs in the conventional wisdom that "bindingness" is a defining characteristic of public policy, but he departs from it radically by arguing that since "[t]he essence of binding policy is the absence of effective choice by the affected party," both large private corporations and governments are institutions which make public policy.[127]

Nadel distinguishes between two types of bindingness. In what he terms sanction bindingness, failure to act in a particular way (for instance, to obey speed limits, to pay taxes) is penalized by the imposition of sanctions after the fact. Although the corporate ability to impose sanctions is limited, situational bindingness, in which "the total situation is controlled," is:

> ...even more pervasive as an element of nongovernmental policymaking .... Environmental degradation is probably the most obvious and pervasive example of situational bindingness. For example, the citizens of Gary, Indiana suffer a binding deprivation of health and aesthetic values due to the air pollution emanating from the plants of U.S. Steel. They may consider this a worthwhile tradeoff for employment and prosperity, but they are nonetheless bound by the policy outputs of the industry ... Pollution, to continue the example, does not simply occur as a spontaneous act of God. It is, rather, the result of identifiable decisions by corporate officials. In short, it is a policy made by those officials — officials who must be considered as part of "the authorities" in the political system .... When we say that a member of the school board in Sheboygan, Wisconsin is part of the authorities but that the

> president of General Motors is not, we cannot go very far in understanding government or corporations.[328]

Corporations clearly function as makers of economic policy, by virtue of their ability to plan production (and, to some extent, consumption) on national and international scales. This set of prerogatives reinforces the corporate ability to "regulate." For instance, corporations (like governments) are, it may be argued, engaging in environmental hazard regulation (the making of binding policy) when their actions result in harm to the health of citizens in the vicinity of their operations or to their own employees.[329] To some extent, this observation is true of the activities of any business. But the extensive economic and political resources of the large corporation demand that its activities be given special consideration by both political scientists and makers of public policy.

It could be argued that in some cases, the resources possessed by corporations coupled with their role in the economy may make their regulatory powers *more* extensive than those of the state. Government regulations to control the situationally binding impact of corporate policy are often backed up by sanctions which cannot be enforced universally (or without disastrous political consequences[330]), and which take effect only after the fact and after (in the case of a corporate regulatee) lengthy and expensive litigation.[331] A corporate polluter can ignore compliance deadlines; a company whose production processes give its workers cancer may well continue their use undetected and unsanctioned for many years. Thus corporate power is both a manifestation of, and a contributor to, the implicit assignment of property rights to polluters discussed earlier.

B. Corporations as Policy-Making Bureaucracies

Corporations whose revenues are in the billions of dollars and whose workforces number in the hundreds of thousands (often in countries around the world) represent highly complex systems for the planning of investment and the exercise of decision-making authority, often on the binding basis discussed previously. Yet a recent review of research in the area notes "a general tendency of sociologists to ignore the inner workings of the large corporation."[332] Some legal scholars have argued, based on the undeniable complexity of the modern corporate organizational structure and of the technologies with which it deals, that it is difficult, if not impossible to ascribe reliably individual responsibility within the corporation for actions causing harm to individuals.[333]

Complexity, however, need not imply an absence of discernible or effective control. If the operating divisions of most large corporations today enjoy a high degree of autonomy in day-to-day decision making, this independence is enjoyed within the context of highly centralized control over planning, finance and long-term objectives, on a national and (often) international scale.[334]

Despite the secrecy which normally surrounds the internal decision making of large corporations, available evidence suggests a number of cases in which senior corporate executives appear to have known about the hazards created by corporate activity or inactivity, if they did not directly order their creation or perpetuation. Published reports and evidence in civil suits indicate that senior company officials were notified of fuel tank defects in certain Beech light aircraft three years before the first of several fatal crashes apparently caused by the defects,[335] and that Ford's Group Vice-President of Car Engineering was at least present at meetings at which discussion involved the profits to be gained by delaying design changes aimed at improving fuel system safety.[336] Memoranda sent to the Assistant Comptroller of Occidental Chemical notified him of the company's illegal waste disposal practices, which were contaminating ground water around its Lathrop, California plant, more than three years before regulatory authorities were provided with this information.[337] And according to another published case-study, the corporate headquarters of Warner-Lambert Inc. refused approval for the expenditure of $33,000 to reduce explosion hazards from ambient magnesium stearate dust in the manufacture of chewing gum. The result was an explosion which killed six employees and injured forty-eight others.[338]

Such examples normally surface only after extensive legislative investigation or civil litigation and might well not meet the more rigorous standards of proof demanded in criminal cases. Yet they provide grounds for healthy skepticism about the view that responsibility for life- and health-endangering corporate policy decisions cannot reliably be assigned to senior executives.[339] It is undoubtedly also true that in many cases, corporate organizational structures are deliberately designed to isolate senior decision-makers from provable knowledge of hazard-creating activities which might subsequently be the focus of legal action, or else have that thoroughly functional effect in the absence of conscious design.[340]

A considerable degree of sophistication about this problem, and about the nature of the corporation as a policy-making institution, is evident in the Law Reform Commission's earlier Paper on ascribing *Criminal Responsibility for Group Action*. The Commission there observed that individual responsibility for the actions of corporations might have to be determined on the basis of an individual's role within the corporate policy-making structure, "by testing the person's behaviour against his responsibilities within the corporation."[341]

The Commission ultimately rejected this approach to criminal responsibility, because of the substantial legal problems involved, recommending instead that the law provide more complete access to internal information needed to determine individual responsibility for corporate policy.[342] This recommendation is extremely important in itself, and the Commission's observations also suggest an important theoretical point. We would not be satisfied with a political theory, or a political system, which did not provide a basis for either determining or assigning responsibility for policy-making actions of governmental institutions. The fact that our political and legal systems generally fail to acknowledge the importance of the parallel problem of accountability in the context of "corporate governments" is itself a powerful mobilization of bias against challenges to the prerogatives of such private governments. In this context, the wisdom becomes apparent of Stone's conclusion that:

> The law ought constantly to be searching out and taking into account the special institutional features of business corporations that make the problems of controlling them (and of controlling men-in-them) a problem distinct from that of controlling human beings in ordinary situations.[343]

Much of the discussion of internal corporate structure has taken place in the rather restricted context of assigning criminal responsibility. If only because it contributes to our understanding of the nature of the beast, it is useful briefly to discuss the internal organizational environment within which corporate decisions are made. As with other bureaucracies, this environment is characterized first of all by the replaceability of individual actors within it. Ermann and Lundman argue that:

> Organizationally beneficial thoughts and actions are forced upon individuals by virtue of the positions they occupy. If individuals holding positions do not behave according to the expectations associated with their positions, they will be replaced.[344]

Within the corporation, the principal (though far from the only) way in which the "organizationally beneficial" nature of actions is judged is through their contribution to either short- or long-term profitability — what Madden calls the "calculus of the bottom line."[345] These pressures can be manifested in any number of ways, sometimes stated (as in the setting by head offices of financial performance targets for operating divisions and their managers[346]) and sometimes unstated. Even chief executive officers, to judge by the numbers of involuntary departures from executive suites, are replaceable. Yet on the other hand, chief executive officers can very fundamentally affect the nature and pressures of the corporate environment — and, by extension, the consequences of corporate action for consumers, workers, and citizens.[347]

These observations are important because there is, it may be argued, little countervailing institutional pressure within the corporate environment in the direction of considering individuals' actions as officials of the corporation in any terms other than those of their impact on corporate objectives.[348] The corporate environment can thus be highly conducive to ignoring, concealing or (perhaps most importantly) rationalizing the adverse impacts of corporate policy on life and limb.

This last conclusion is clearly a hypothesis susceptible to evaluation on the basis of more extensive research. However, two examples will suffice to suggest the workings of this dynamic in practice. A 1976 survey of corporate managers and professional staff reported in the *Harvard Business Review* indicated that superiors' pressure toward "unethical conduct" was seen as widespread in American business.[349] And a frightening role-playing experiment involving business students from several countries, many with working experience in management, demonstrates the extent to which the importance assigned to corporate economic performance can affect the ethics of managers and the decisions of managements.[350]

Subjects acted as "members of the Board" of Upjohn Corporation, and were asked how Board members should respond to a situation Upjohn had actually faced involving U. S. Food and Drug Administration attempts to block further sale of the fixed-ratio antibiotic, Panalba. There was abundant scientific evidence that Panalba was potentially dangerous to users, and of limited effectiveness ... but it was also a major contributor to Upjohn's profits.[351]

The options offered ranged from voluntary removal of the drug from the market in advance of formal regulatory action to active resistance of the FDA initiative. In repeated runs of the experiment over five years, 79 *per cent* of simulated "Boards" chose the course of action described by Abrahamson as "highly irresponsible:" "Continue efforts to most effectively market Panalba and take legal, political and other necessary actions to prevent the authorities from banning Panalba."[352]

The point here is not that the corporate environment breeds ogres, nor that treating corporate infliction of harm on the basis of individual responsibility is always or even often the most effective way to prevent it. However, the law and the political process must develop more sophisticated and effective ways of countering the kinds of pressures *within* the corporate environment described in the previous paragraphs. These pressures militate strongly in favour of the infliction of harm in the service of profitability, yet many commentators have convincingly argued that they are reduced insufficiently, if at all, by existing legal sanctions for corporate violations of laws of various kinds.[353]

III. Corporations as Policy-Makers: Dealing with Governments

Governments can and do, of course, impose numerous limits on the scope and content of corporate public policy. The fact that such limits exist, and that corporations frequently protest their scope, does not demonstrate that corporations are relatively less powerful than, or powerless relative to, the governments of the states in which they operate. Rather, these disagreements reflect a conflict over the legitimate limits to the authority of two different kinds of governing institutions, with two (at least somewhat) different sets of objectives and mandates. The objectives of the corporation are oriented toward profitability, though as noted earlier this does not mean that corporations always, or even usually, maximize profits in the short run. Those of governments are much less easily defined, and are more complex and multi-dimensional.

Yet governments are limited in their ability to constrain corporate policy by several related factors. The first is large corporations' ability to use their financial resources to influence government policy on specific issues. They can afford to fund extensive scientific research to support their particular point of view; to underwrite extensive and well-prepared participation in formal regulatory proceedings; and to sustain protracted litigation.[354] This last fact alone allows concerted corporate resistance to immobilize all but the best-financed regulatory agencies. They can also "absorb" many kinds of financial sanctions directed at the corporation, by passing them on to customers or shareholders.[355] Above and beyond their use of product advertising as an instrument of corporate strategy — an instrument whose use by a large number of firms over a long period of time, it may be argued, has serious political implications in itself[356] — large corporations' financial resources provide direct access to public opinion through advocacy advertising by individual firms or their trade associations.[357]

Conflicts between the objectives of "productive" investment and of protecting citizens from environmental hazards are sometimes recast in terms of individual citizens' conflicting desires for wealth and income, on the one hand, and for protection from environmental hazards on the other.[358] This approach ignores the ability of the large corporation, by virtue of its control over investment flows, *to impose tradeoffs* on those who live with or around it — particularly when they are a major source of employment in a region (or even a nation). In numerous examples in the literature, residents of areas whose economic life depends heavily on one firm or industry have "sided with the company," and opposed demands for more control of environmental pollution or workplace hazards.[359] The implicit threat of production cuts, layoffs, and possibly complete relocation is often sufficient to dissuade even those who may be most severely victimized by environmental externalities from establishing a claim to be free of them.

Apart from being a crucial component of the corporation's role as maker of public policy, the ability to impose such tradeoffs is a powerful lever for use in negotiating with government agencies. The contribution of a particular industry to local or regional employment and economic activity can be used to mobilize opposition within the political system, on the part of legislators from economically dependent regions; officials of "functionally related" departments; and officials of departments generally responsible for sustaining economic or industrial development.

A large component of the economic policy of any mixed or free enterprise industrial economy involves the systematic provision of financial incentives to encourage private investment and other measures to create a "favourable business climate." Government policy in any number of other areas, ranging from environmental protection to the provision of welfare services, must often operate in a context of latent conflict between the objectives of these policies and the need to avoid protracted conflict with the private sector.[360] This may be one reason the province of Ontario granted repeated and uncritical extensions of deadlines for compliance with environmental objectives to Inco Ltd. and Reed Paper, both the major employers in their communities.[361] Similar extensions were granted to Algoma Steel, in Sault Ste. Marie, despite numerous complaints by area residents and despite criticism of Algoma's arguments by agency staff.[362]

Such conflicts usually remain latent; when they do become overt, however, industry-wide capital strikes can be used effectively against government policies which threaten reductions in business autonomy or profitability.[363]

The use of locational and investment decisions as a lever to influence government policy is an essential element of corporate policy making at the national level. But it becomes even more important in the case of transnational corporations (TNCs), whose expanding importance in the international economy has been extensively documented elsewhere.[364]

TNCs are organizations which plan production, and attempt to minimize costs, on an international rather than national scale with the objective of improving the efficiency (that is, profitability) of their operations.[365] This is, in fact, the pivotal rationale for expansion on a transnational scale.

Operating on this scale drastically increases the bargaining power of the firm in dealing with individual "host governments." TNCs regard host government intervention as "a major infringement on the general *strategic autonomy* of MNC managers"[366] (emphasis in original) — a striking confirmation of the corporation's role as an organization for planning and implementing public policy. Texts on the management of TNCs explicitly note the importance of TNCs' control over investment as a way of inducing governments to adopt policies more congenial to profitable foreign investment.[367]

A fine example of how the leverage of TNCs may be used to influence environmental hazard policy (one of many contributors to, or detractors from, a nation's investment climate) is provided by the reaction of the Canadian Chemical Producers' Association to arguments for more extensive access to information related to health effects of its members' products. CCPA claims that release of such information might compromise the confidentiality of proprietary information about product and process technologies:

> As you might expect, multi-nationals carefully rate the major industrial countries in the world for their track record in protecting confidential information.[368]
>
> It is a fact that if unnecessary or excessive costs, delays or uncertainty are introduced unilaterally by any country, (or province), innovation and development will simply cease or be transferred to jurisdictions with a more favourable business climate. Should this happen in Canada, it could be very quickly reduced to a warehouse economy for chemicals.[369]

Such a threat, coming from the trade association of an industry with a high level of TNC ownership, whose members' Canadian output amounts to $5 billion a year and whose work-force to 26,000,[370] cannot help but exert a significant influence on government policy.

The centralization of financial control which is a characteristic feature of TNC organization can seriously limit a government's ability to control the activities of subsidiaries. In addition to underlying a fundamental shift in the "balance of power" in economic policy between governments and the international private sector, this fact has important implications for environmental hazard policy. For example, in 1979 a Reed Paper spokesman told an Ontario legislative committee that the firm would shut its Dryden, Ontario plant if the provincial government held firm on a proposed pollution control deadline. The British parent corporation (which controlled 87 per cent of Reed's shares) would simply refuse to provide the necessary additional capital for an accelerated pollution control program.[371] Whether the corporate protestations are true or not, a government's options in such a situation are limited.

Canadian public policy may be particularly affected by the phenomenon of the TNC, because of the high level of foreign control in the Canadian economy: roughly half of Canada's largest 400 firms operate under majority foreign ownership and hence, a greater or lesser degree of control by the parent company.[372] Thus, decisions about compliance or non-compliance with Canadian environmental hazard law, especially when compliance would involve substantial capital investment, may be made outside Canada's borders, on the basis of conformity to an international corporate plan. Yet on the other hand, many of the powers of TNCs can be employed in dealing with "home," as well as host governments — for example through explicit or implicit threats to relocate investment offshore.

Governments' bargaining power in their dealings with TNCs depends on a number of factors including the importance to the firm of the markets to which the government controls access; the diversity and indigenous technological capability of the national economy; and governments' willingness to offer subsidies or implement other policy measures conducive to a favourable investment climate.[373] The point is not that states are powerless in dealing with large corporations. Rather, their size and control over investment flows confer on TNCs the ability to negotiate with national governments at least as equals, even in the case of the affluent, economically diverse and highly industrialized societies of western Europe.[374]

CHAPTER FIVE

Thematic Observations and Conclusions

I. We Treat Economic Activity Differently

As argued in Chapter Three, using the criterion of efficiency in the allocation of resources to determine the proper objectives of public policy implies that harms generated as an effect of economic activities which produce marketable output should be accorded a status quite distinct from that accorded to harms created in other ways, for example, as a result of street attacks or domestic quarrels. But this "special treatment" of harms resulting from economic activity is not restricted to explicit applications of the efficiency criterion. The application of an implicit and non-specific cost-benefit balancing approach appears to be a much more general feature of environmental hazard policy.

Risk analysts, for example, distinguish between "risks imposed by particular individuals on others" such as speeding, drunken driving, and child abuse and "risks generated by production externalities" such as air and water pollution and hazardous wastes.[375] On the other hand, a number of commentators suggest that exposing individuals to dangerous machinery or cancer-causing substances could be regarded as criminal under existing legislation, but is seldom if ever treated as such when the victimization in question occurs in the workplace as part of the "productive" process.[376]

One explanation for this differential treatment, of course, is the white-collar, "respectable" nature of the potential defendants.[377] Trezise notes in this context that:

> [P]ollution is largely the result of otherwise legitimate and socially desirable activities carried on by respectable enterprises, and the majority of the public, as well as the courts, simply do not recognize it as criminal behaviour.[378]

Other analysts, although they may agree with this description of judicial or administrative attitudes, challenge their underlying assumptions. Geis and Monahan compare on the basis of consequences, rather than of putative benefits, the "unsubtle violence" typefied by street crime and the "subtle violence" of injury and death generated when corporations fail to warn of, or redesign, unsafe products.[379]

The debate on pollution (or the creation of other environmental hazards) as potentially criminal raises complex legal implications. These are examined in a forthcoming Commission Working Paper,[380] and are not considered further here. However, our reluctance to treat the creation of such hazards as criminal is important in that it illustrates the extent to which we, as a society, are willing to tolerate the imposition of certain kinds of injury (Bogen's benevolently imposed risks) in return for an (assumed) return in the form of expanded measures of marketed output.

To provide just one further example: Zeckhauser proposes that we value prolongation of life for purposes of public policy on the basis of "quality-adjusted life-years" (QALYs).[381] It follows from doing this, *inter alia*, that it is more important to protect young people than old people from the particular hazard under discussion. Yet would we apply such a criterion to harms not resulting from (*presumably* beneficial) economic activity? Would we be satisfied with a law enforcement policy that allocated street patrols on the basis that it was more important to protect the lives of young people than of old?

This brief analysis, paradoxically, leads to consideration of the only really substantial argument for cost-benefit analysis as an element of public decision making. The fact that CBA is not performed does not mean that comparisons of the costs and benefits of proposed policies are not being made. They are being made, every day and routinely, by governments at all levels, and with respect to public policy in myriad areas.[382] Ironically, the analyses undertaken in Chapters One and Three suggest that the mobilization of bias inherent in CBA is very similar to that of the existing distribution of resources within the political decision-making process. The decision-making process *need not* embody these biases, at least not to the same overt extent. For this reason, the most important recommendation of this chapter involves reforms of the decision-making process. However, first it is necessary to address a theoretical controversy which has become particularly prominent since the rise of agitation for "deregulation."

II. Government Intervention: Infringement of Liberty or Choice among Governing Bodies?

Arguments that the bounds of governmental control of environmental hazards should be restricted, or should not be expanded, are frequently couched in terms of the alleged conflict between individual freedom and social control. Indeed, at least one economist has gone so far as to argue that the deprivation of liberty which (purportedly) accompanies any government intervention should be counted as a "cost" in a complete cost-benefit analysis[383] — although it is clearly not a cost measurable in terms of reduced output, nor a benefit whose value can be intelligibly determined in dollar terms without doing violence to the concept.

The unacknowledged contamination of ground water which serves as a drinking water supply; the discharge of mercury into a watercourse whose fish serve as the principal source of sustenance for a substantial native population; and the exposure of industrial workers to unspecified concentrations of chemicals whose identity is kept secret are fairly typical examples of serious environmental hazards. They illustrate that the purported conflict between individual liberty and government control is in most cases a red herring. Rather, what is at issue is the extent to which one policy-making institution (government) shall be allowed to limit the ability of another set of institutions (private firms) to inflict hazards — in other words, to "regulate" on the basis of situationally binding policies. Individual freedom provides a convenient arguing point; however, the absence of government intervention can only be equated with an increase in freedom if one assumes, *a priori*, that the only kind of public policy which can restrict freedom is that made by governments. This premise is insupportable. What is usually at issue is "the freedom to get rich"[384] by imposing externalities on other actors.

Only in very specific cases like the attempt to restrict the availability of saccharin even as a labelled ingredient in food products, or to require the installation of passive restraints instead of lap-and-shoulder belts in automobiles, has the notion of regulation as a limitation on *individual* freedom any conceptual integrity. In these relatively atypical instances there is a case for limiting the scope of governmental intervention. Yet it must also be remembered that the availability of lap-and-shoulder belts, for instance, is the result not of the workings of a market which provided what consumers demanded, but of more than a decade of pressure by citizens acting *outside* the market and later, by governments — initiatives which were bitterly resisted, at great expense, by the manufacturers of automobiles.[385] The same is true of a number of other safety features now incorporated into North American automobiles, and of the publicization of manufacturers' recalls to correct safety-related vehicle defects. These examples suggest that a further area of legitimate (and sometimes urgently needed) governmental intervention involves steps to expand the availability of information, and of options, presently denied to consumers.

Such arguments also neglect the far larger number of instances in which consumers are denied knowledge of even the names of the substances to which they are being exposed (as in the case of Canadian food and cosmetic ingredients). In the field of occupational hazards, the "liberty" argument is weakened by similar information limits, and by the power of the firm to impose trade-offs on their workers and on communities. In the environmental field, the argument is even less credible: how much would the liberty of residents of the Love Canal area have been limited by earlier, or better-enforced, restrictions on burying poisons and then forgetting about them?

III. Innovative Approaches to Sanctioning Are Needed

The discussion in Chapter Four suggests that considerably more attention should be paid to the kinds of sanctions which have the greatest chance of securing corporate compliance with public policies aimed at controlling the creation of environmental hazards. Economists often argue that the obvious solution to this problem is either an effluent charge, a marketable pollution right, or a financial penalty applied proportionately to the length of time during which a polluter has failed to comply with requirements that effluents be reduced to a certain level. In either case, the virtue of the sanction is that it (a) is automatically applied, and (b) appeals to the principal motivation of the corporate offender, which is assumed to be a rational economic actor whose objective is cost-minimization (or profit-maximization).

Such policy instruments are most easily applied to problems which involve emissions from a clearly identifiable set of point sources or categories of point sources (such as automobiles).[386] It would be more difficult, although perhaps not impossible, to apply analogous sanctions to control the diffusion of potentially hazardous substances from a large number of sources throughout an entire ecosystem. It is also not clear how they could be applied in cases involving workplace health hazards, or dangerous consumer products.

Two more basic difficulties present themselves. The first is that given the inapplicability of automatic financial penalties to every case involving environmental hazards, other kinds of sanctions will still be required in instances where such measures are not useful. In these cases, simple appeals to economic motivations may not be the answer. Coffee[307] argues convincingly that where the chance of apprehension and conviction is low or uncertain, there may be *no* level of financial sanction which will deter a corporate offender short of forcing it into bankruptcy. He also points out that the nature of corporate bureaucracy is such that risks which might appear unacceptable to the corporation as a purely "rational" economic actor, might nevertheless be accepted by individuals in decision-making positions within a corporation. And the complexities of transnational corporate structure mean that a given political jurisdiction may not be able to apply any level of economic sanction which will be sufficient to alter the cost-benefit balance as calculated on the basis of the firm's global objectives. These and related complexities of sanctioning as applied to corporations make it essential that more research be done on sanctions whose effectiveness does not depend on abstract analyses of, or assumptions about, the economic best interests of the corporation as a whole.

More fundamentally, even assuming that charges or automatic noncompliance penalties were implemented, we might expect charge or penalty levels to become the subject of protracted bargaining, and their application to be characterized by frequent pleas for exemption on grounds of special circumstances. "The comparison between, say, an uncorrupted system of effluent charges and a regulatory machinery captured by special interests is a specious one."[308] Indeed, the better effluent charges or similar measures could be expected to work (and in some circumstances, they would work very well indeed), the more violently the affected industries could be expected to oppose them. Given the extensive political resources of such industries individually, and of business collectively, it is probably much less useful to debate the relative theoretical worth of various kinds of sanctions than to focus on the political process by which both objectives and sanctions for noncompliance are decided upon.

IV. Procedural Reform Should Be a Focus of Law Reform

Attempts at law reform in the environmental hazard field may have little impact if their focus is restricted to specific substantive changes, such as the creation of new offence sections, the entrenchment in statute of new sanctioning powers or the establishment of environmental Bills of Rights. These initiatives are important, but their long-term significance will derive principally from the extent to which they are part of a program of restructuring the *process* by which decisions about both the content and the enforcement of environmental hazard law are made.

This recommendation rests on two general normative premises, in addition to the pragmatic arguments developed in the previous paragraphs and in Chapters One and Four. The first is that it is better for conflicts to be resolved on the basis of open debate, or at least on the basis of explicit acknowledgement of the kinds of decisions and value judgments at issue, than for them to be resolved by conceptual fiat — that is, "organized out" of the overt political process. One of the justifications for this premise is that increasing the visibility of the governmental decision-making process may reduce the extent to which industry priorities remain unchallenged.

The second, and related premise is that the legitimacy of decisions about who is entitled to do how much of what to whom (which is what much environmental hazard policy involves) is a function not only of the defensibility of decision rules, but also of process: have those who are being asked to bear the risks had a chance to indicate whether or not they regard the risks in question as acceptable? This seems rather platitudinous when stated in such a manner, yet (as noted in Chapter Three) this is precisely the kind of question which is not asked, for instance, by attempts to determine acceptable risk levels on the basis of the efficiency of the outcomes which result.

The general thrust of procedural reforms should be, by providing resources of various kinds to those constituencies which are currently disenfranchised, to organize a number of the conflicts discussed in this Paper back into the political process as it is more usually understood.

Of the many observers who have called for reforms to the Canadian decision-making process, Castrilli and Lax[300] have provided the most extensive proposed set of generic changes. These include provisions for public involvement in the setting of priorities and general policy objectives; statutory requirements for notice and comment, for initiation of a hearing by all interested parties, and for initiation of regulatory activity by parties outside an agency; requirements for disclosure of all information on which a proposed decision is based, and that agencies make decisions on the basis of a record of comments or proceedings; prohibitions of off-the-record communications between industry (or other parties) and agency personnel; reductions in administrative discretion with respect to the implementation of regulations; and provisions for judicial review where such procedures are not followed.

At least three further general kinds of change can be isolated. The first involves statutory entitlements to access to relevant information (such as chemical names and test data) even before it becomes part of any specific regulatory proceeding. The second involves the provision of funds to organizations acting as advocates for increased protection from environmental hazards within the regulatory process — an advantage which is already, as noted in Chapter One, enjoyed by industry through the tax-deductibility of advocacy expenses. A third is the kind of augmentation of the resources of potential victims in specific situations which is typified by legislation now in force in several provinces giving workers the right, at least in some circumstances, to refuse work they believe to be unsafe.[190] Related to this, public policy might encourage either civil suits or private prosecutions with respect to environmental pollution. Litigants might be protected against the awarding of prohibitive defendants' costs. Indeed, a policy might be followed — as is sometimes done in the United States — of paying the costs of unsuccessful environmental litigants in particularly important cases.[191] And at a minimum, regulatory agencies could refrain from placing any barriers in the way of private prosecutions for violations of environmental hazard law. All these can be categorized as provisions which reduce the disparity in resources (broadly defined) between potential generators and potential victims of environmental hazards.

This is not a complete "shopping list," by any means, but it does provide an indication of the potential for reducing (or countering) the existing mobilization of bias within environmental hazard policy — a mobilization which almost without exception favours the (actual or potential) creators of hazards.

At least two possible objections should be acknowledged in conclusion. The first is that such a policy framework appears to be overly legalistic, particularly at a time when considerable interest is being expressed in moving away from legalistic, adversary modes of policy making. No doubt, increasing formalization of the process by which environmental hazard policy is made creates increased opportunities for delay and litigation. Yet this frequent criticism of proposals for reform ignores the reality that under the present system, access to which depends on the discretion of the regulatory agency and the resources of the prospective participant, opportunities exist for *indefinite* delay, if not for flagrant perversion of the objectives of environmental hazard policy.

It may well be that further research and deliberation will produce solutions which provide access and reduce disparities in resources without the degree of formalization implied by the ideas listed in the previous paragraphs. Yet the question may come down to one of whether or not a bit of legalism is preferable to a lot of disenfranchisement. It should also be noted that such procedural recommendations do not address the issue of the kinds of policy instruments which will ultimately be adopted. Indeed, the degree of constituency support necessary to sustain an effective regime of sanctions for environmental hazard creation based on an administrative, rather than a command-penalty model, might only develop as a result of such reforms in the policy process.

A second possible objection involves the "anti-industry" orientation of such reforms. Such objections carry the implication that under present circumstances the resources of industry and those of other interested parties are at least qualitatively, if not quantitatively comparable. A basic conclusion of the present Paper is that this is not the case. Under the most balanced procedural regime imaginable, industry will still control more extensive financial resources than other interested parties, will maintain the bargaining advantage derived from control over investment flows, and will still have to be dealt with on a day-to-day basis in attempting to achieve compliance. But these advantages become overwhelming, and ultimately unacceptable in terms of the one-sided definitions of the issues and outcomes of decision processes which result, when they are reinforced by a set of statutory constraints which make access to decisions about the acceptability of particular hazards or of general levels of hazard creation dependent on administrative discretion, prior perceived legitimacy, and money.

Given the arguments made at various points in the present Paper about the nature of the influence and constraints on government influence, such proposals for procedural reform may appear utopian. In fact, the process by which they could be expected to lead to significant long-term increases in the protection enjoyed by Canadian citizens from the unsanctioned imposition of environmental hazards is much more complex than implied here. Shifts in orientation could be anticipated (and should be cultivated) in governmental decisions about individual pesticides, food colourings, process chemicals, and so forth. Perhaps more important, however, is the general increase in public attention to environmental hazard policy which a less closed and less consistently biased regulatory environment would generate, and the impact (in turn) which that attention might have on the political process.

The general thrust of the argument made here is that those citizens attempting, individually or collectively, to protect themselves from the impacts of corporate policy on their life and health are consistently forced to play against a stacked deck. The present Paper has attempted to describe many of the irregularities in that deck. But it is less important that the reader agree with the particular conclusions reached here, than that he/she understand the general importance of looking closely at the cards. Particular issues or controversies may be absent from existing decision-making processes and conceptual frameworks, not because they are unimportant or because no one cares, but because they can be raised within those contexts only with extreme difficulty, or because those who might raise those concerns have been consistently excluded from the relevant decision-making fora.

Endnotes

1. E. Schattschneider, *The Semisovereign People* (Hinsdale, Ill: Dryden Press, 1975), p. 66.

2. *Ibid.*, p. 69.

3. W. Leiss, "Political Aspects of Environmental Issues," Leiss, ed., *Ecology versus Politics in Canada* (Toronto: University of Toronto Press, 1979), p. 261.

4. See P. Bachrach, *The Theory of Democratic Elitism: A Critique* (Boston: Little, Brown, 1967), p. 78, where a nondecision is defined in terms of "those important instances where the dominant values, procedural rules, power and authoritative relations, singly or in combination, effectively prevent a latent issue from developing into a question which requires a decision."

   One of the major theoretical controversies of the 1960s in political science involved the extent to which such structural constraints should be taken into account in defining and evaluating political power. "Behaviouralists" tended to argue that only observable interactions and conflicts among political actors should be considered the stuff of politics — an approach which would result in failure to acknowledge most of the factors discussed in the present Paper. See H. Kariel, ed., *Frontiers of Democratic Theory* (New York: Random House, 1970), Parts II and III. For a critique of the behaviouralist approach, see among other sources Bachrach, *ibid.*; C. McCoy and J. Playford, eds., *Apolitical Politics: A Critique of Behavioralism* (New York: Crowell, 1967).

5. A. Culyer, "The Quality of Life and the Limits of Cost-Benefit Analysis," L. Wingo and A. Evans, eds., *Public Economics and the Quality of Life* (Baltimore: Johns Hopkins University Press for Resources for the Future, 1979), p. 141.

6. S. Kelman, *What Price Incentives? Economists and the Environment* (Boston: Auburn House, 1981), p. 5.

7. H. Lasswell, *Politics: Who Gets What, When, How* (New York: Meridian, 1958).

8. Much information on the workings of the regulatory process has been generated recently by the hearings of the Parliamentary Special Committee on Regulatory Reform (Peterson Committee) and studies conducted by the Economic Council of Canada as part of its Regulation Reference study.

The most important Regulation Reference studies include B. Felske, *Sulphur Dioxide Regulation and the Canadian Non-Ferrous Metals Industry*, Technical Report No. 3 (Ottawa: Economic Council, 1980); P. Nemetz, "Regulation of Toxic Chemicals in the Environment," Working Paper No. 20 (Ottawa: Economic Council, 1981); P. Victor and T. Burrell, *Environmental Protection Regulation, Water Pollution and the Pulp and Paper Industry*, Technical Report No. 14 (Ottawa: Economic Council, 1981). See also the interim report of the Council, *Responsible Regulation* (Ottawa, 1979) and the final report on *Reforming Regulation* (Ottawa, 1981). Environment Canada's testimony before the Peterson Committee is contained in House of Commons Special Committee on Regulatory Reform (hereinafter Peterson Committee), *Minutes of Proceedings* 6, September 24, 1980.

Several extensively researched recent commentaries have been drawn upon for this chapter: P. Elder, ed., *Environmental Management and Public Participation* (Toronto: Canadian Environmental Law Association, 1976); A. Lucas, "Legal Foundations for Public Participation in Environmental Decision Making" (January, 1976), 16 *Natural Resources Journal* 73; M. Carswell and J. Swaigen, *Environment on Trial*, rev. ed. (Toronto: Macmillan, 1978); J. Swaigen, "Environmental Law 1975-1980" (1980), 12 *Ottawa Law Review* 439; M. Rankin, "Information and the Environment: The Struggle for Access," J. Castrilli and C. Lax, "Environmental Regulation-Making in Canada: Towards a More Open Process," both in J. Swaigen, ed., *Environmental Rights in Canada* (Toronto: Butterworths, 1981); J. Castrilli, "Control of Toxic Chemicals in Canada: An Analysis of Law and Policy" (1982), 20 *Osgoode Hall Law Journal* 322; R. Gibson, *Industrial Pollution Abatement and the Use of Environmental Control Orders in Ontario* (Toronto: Canadian Environmental Law Research Foundation, 1983, in press).

9. An exhaustive legislative history and critique of the Act is provided by Castrilli, *supra*, note 8.

10. Hon. J. Davis, in *House of Commons Debates*, April 24, 1974, p. 1729.

11. Hon. J. Sauvé, in House of Commons Standing Committee on Fisheries and Forestry, *Minutes of Proceedings* 16, April 11, 1975, p. 6.

12. Davis, *supra*, note 10; W. L. Canniff (Technical Director, Canadian Chemical Producers' Association), in House of Commons Standing Committee on Fisheries and Forestry, *Minutes of Proceedings* 18, April 18, 1975, p. 4.

13. Canniff, *ibid*.

14. Canadian Environmental Law Association, "Brief Containing Recommendations on Bill C-25, the Environmental Contaminants Act" (Toronto: mimeo), presented to Standing Committee on Fisheries and Forestry, May 1975.

15. The only chemicals regulated under the Act as of January, 1982 were PCBs, chlorfluorocarbon aerosol propellants, Mirex, polybrominated biphenyls and polychlorinated terphenyls. See Departments of Environment and of

National Health and Welfare, "Priority and Candidate Chemicals: Schedule to Environmental Contaminants Act," *Canada Gazette* Part I, January 16, 1982.

16. Castrilli, *supra*, note 8, pp. 343-345; on the weaknesses of the *Act* see also R. H. Hall, "Environmental Contaminants Act: Legislation Based on an Impracticable Premise" Appendix A in ***Roundtable Discussion on Toxic Chemicals Law and Policy in Canada*** (Toronto: Canadian Environmental Law Research Foundation, mimeo, 1981); comments of J. Brydon, Director-General, Toxic Chemicals Management Centre, Environment Canada, in ***Roundtable Discussion***, p. 131.

17. Environment Canada, "Submission to the Parliamentary Task Force on Regulatory Reform," in Peterson Committee, *supra*, note 8; ***Outside Review and Public Participation***, Second Report of the PCB Board of Review under *Environmental Contaminants Act* (Ottawa: Environment Canada, 1980), pp. 340-341; Victor and Burrell, *supra*, note 8, pp. 60-62.

18. Victor and Burrell, *supra*, note 8, p. 61; T. Leah, "Hazard Assessment for Purposes of Federal Legislation in Canada," M. Bratzel, ed., ***Workshop on Hazard Assessment*** sponsored by Great Lakes Water Quality Board, International Joint Commission (Windsor: IJC, 1979), pp. 10-13.

19. Environment Canada, "Submission," *supra*, note 17, p. 6A.4.

20. Comments of R. M. Robinson, Assistant Deputy Minister, Environmental Protection Service, in Peterson Committee, *supra*, note 8, p. 5. Since then, the Department has implemented a non-statutory internal *Policy for Public Consultation and Information Availability* (Ottawa: Environment Canada, 1982).

21. A. B. Morrison, Assistant Deputy Minister, Health Protection Branch, in Peterson Committee, *Minutes of Proceedings* 24, November 6, 1980, p. 19. See also his testimony at pp. 7, 10-12. Health and Welfare is responsible jointly with Environment Canada for administering the *Environmental Contaminants Act*; is responsible for regulating the safety of food additives and prescription drugs; and provides advice to Agriculture Canada on the health effects of pesticides, for whose registration for use in Canada the latter department is responsible under the *Pest Control Products Act*.

22. W. Coleman and H. Jacek, *The Political Organization of the Chemical Industry in Canada*, presented to the Canadian Political Science Association (Hamilton, Ont.: McMaster University, 1981, mimeo), pp. 57-58.

23. On Ontario, see Victor and Burrell, *supra*, note 8; Felske, *supra*, note 8. At the time Québec's *Regulation respecting the quality of the atmosphere* (R.R.Q., c. Q-2, r. 20) was being developed, Noranda Mines, the main source of sulphur dioxide emissions in the province, was able to obtain an exemption from the Regulation for its copper smelters. See J.-P. Rogel, *Un Paradis de la Pollution* (Sillery: Presses de l'Université du Québec, 1981), p. 166.

24. Gibson, *supra*, note 8.

25. Castrilli and Lax; Elder, ed.; *supra*, note 8.

26. A. Thompson, *Environmental Regulation in Canada* (Vancouver: Westwater Research Centre, University of British Columbia, 1981), p. 33.

27. Comments of Robinson, *supra*, note 20, p. 35; Victor and Burrell, *supra*, note 8, p. 124.

28. Comments of L. Edgeworth, (former) Assistant Deputy Minister, Environmental Protection Service, as cited by Castrilli and Lax, *supra*, note 8, pp. 340-341; Victor and Burrell, *supra*, note 8, pp. 49, 124.

29. G. B. Doern, *Regulatory Processes and Jurisdictional Issues in the Regulation of Hazardous Products in Canada*, Background Study No. 41 (Ottawa: Science Council of Canada, 1977), pp. 99, 109.

30. On the absence of exposure standards, see R. Franson, *Canadian Law and the Control of Exposure to Hazards*, Background Study No. 39 (Ottawa: Science Council of Canada, 1977), pp. 35-37, 45.

31. Victor and Burrell, *supra*, note 8, pp. 65, 145.

32. *Ibid*., pp. 32, 41-43; Legislature of Ontario Standing Committee on Resources Development, *Final Report* on Acidic Precipitation, Abatement of Emissions from the International Nickel Company Operations at Sudbury, Pollution Control in the Pulp and Paper Industry, and Pollution Abatement at the Reed Paper Mill in Dryden (Toronto: Government of Ontario, 1979), pp. 88-97.

33. Economic Council, *Reforming Regulation*, *supra*, note 8, pp. 104-105; P. Manga, *Occupational Health and Safety: Issues and Alternatives*, Technical Report No. 6 (Ottawa: Economic Council of Canada, 1981), pp. 185-191, 215, 245; G. Reschenthaler, *Occupational Health and Safety in Canada: The Economics and Three Case Studies* (Montréal: Institute for Research on Public Policy, 1979), p. 80.

34. P. Sabatier, "Social Movements and Regulatory Agencies: Toward a More Adequate — and Less Pessimistic — Theory of 'Clientele Capture'" (1975), 6 *Policy Sciences* 301, at pp. 309-310.

35. *Ibid*., pp. 317-318.

36. *Ibid*.

37. K. Keiser, "The New Regulation of Health and Safety" (1980), 95 *Political Science Quarterly* 479.

38. Castrilli and Lax, *supra*, note 8, p. 334.

39. By contrast, in the United States the *Clean Air Act* (1970) and the Federal *Water Pollution Control Act* (1972) specified very tight timetables: these ultimately proved unworkable, but one wonders whether the action which did occur, for example in the area of automotive emissions control, would have proceeded as rapidly (or at all) without such a timetable. See A. Marcus, "The Environmental Protection Agency," in J. Wilson, ed., *The Politics of Regulation* (New York: Basic Books, 1980); A. Freeman, "Air and Water Pollution Policy," in P. Portney, ed., *Current Issues in U. S. Environmental Policy* (Baltimore: Johns Hopkins University Press for Resources for the Future, 1978).

40. The number of chemicals used in commerce (and hence potential threats to workers and the environment) for which action might be required under the U.S. *Toxic Substances Control Act*, for instance, is over 55,000. U. S. Council on Environmental Quality (CEQ), *Environmental Quality 1980* (Washington, D.C.: U. S. Government Printing Office, 1981), p. 233.

41. For example, Section 14 of Ontario's *Environmental Protection Act* and Section 33 of the federal *Fisheries Act*.

42. This paradox has been pointed out by P. Elder, "An Overview of the Participatory Environment in Canada," Elder, ed., *supra*, note 8, pp. 374-375.

43. *Environmental Contaminants Act*, S.C. 1974-75-76, c. 72, s. 4.

44. *Ibid.*, s. 5.

45. *Clean Air Act*, S.C. 1970-71-72, c. 47, s. 7; see commentary in R. Franson and A. Lucas, eds., *Canadian Environmental Law* (Toronto: Butterworths, 1981), vol. 1, section 4.2. Similarly broad prohibitions can be found in Ontario's *Environmental Protection Act*, S.O. 1971, c. 86, s. 14 (see commentary in Carswell and Swaigen, *supra*, note 8, pp. 28-32); and Québec's *Environment Quality Act*, R.S.Q., c. Q-2, s. 20(2).

46. In Ontario, the use of a stop order against a Toronto lead smelter in 1973 was overruled by the court on the grounds that immediate danger had not been proved; see Doern, *supra*, note 29, p. 124, and C. Lax, "The Toronto Lead Smelter Controversy," Leiss, ed., *supra*, note 3. In the United States, the Occupational Safety and Health Administration's controversial benzene exposure standard was invalidated by the Supreme Court on the grounds that OSHA had not demonstrated a significant risk at all levels above that specified in the standard. See P. Grove, "The Billion-Dollar Benzene Blunder: Supreme Court Scrutinizes OSHA Standards in *AFL-CIO* v. *American Petroleum Institute*" (1980), 16 *Tulsa Law Journal* 252.

47. See comments of J. Brydon in *Roundtable Discussion*, *supra*, note 16, p. 12.

48. See Castrilli, *supra*, note 8.

49. *Canada Water Act*, R.S.C. 1970 (1st supp.), c. 5, ss. 11 and 16(1).

50. Manga, *supra*, note 33, p. 183; C. Reasons, *Assault on the Worker* (Toronto: Butterworths, 1981), p. 215.

51. Sauvé, *supra*, note 11, p. 8.

52. R. Hirshhorn, *Product Safety Regulation and the Hazardous Products Act*, Technical Report No. 10 (Ottawa: Economic Council of Canada, 1981), pp. 45, 107.

53. W. Neff, "Toxic Chemical Information: An Industrial Perspective," Appendix C to *Roundtable Discussion*, *supra*, note 16, pp. 2-3.

54. Comments of Robinson, *supra*, note 20, p. 7. His comment that consulting with industry is "much cheaper" than obtaining information independently suggests a Procrustean bed in which an agency is trapped by industry's

control of information on the one hand, and by the cost of obtaining its own information on the other.

55. M. Keating, "Safety Tests Faked, but 79 Pesticides Remain on Market," *The Globe and Mail*, April 27, 1981. One of the case studies to be reviewed in a forthcoming Law Reform Commission Working Paper is that of Captan, one of the substances tested by IBT: Captan was allowed to remain on the market despite the fact that by January 1980, the Canadian and American investigators jointly reviewing the data on Captan had concluded that all but one of the tests on which approval for sale was based were invalid. See memorandum, J. Auerbach, Branch Chief, Regulatory Analysis and Lab Audits Branch, to H. Hall, Chief, Branch I Pesticide Review Division, U.S. Environmental Protection Agency, "Review of IBT studies on Captan," January 1980.

56. G. B. Doern, *The Peripheral Nature of Scientific and Technological Controversy in Federal Policy Formulation*, Background Study No. 46 (Ottawa: Science Council of Canada, 1981), p. 44.

57. F. Anderson, *Environmental Improvement Through Economic Incentives* (Baltimore: Johns Hopkins University Press for Resources for the Future, 1977), p. 16. Some commentators (see Thompson, *supra*, note 26, pp. 14-15) argue that a major part of the problem is the command-penalty model of most environmental legislation, and claim that a system of administratively imposed financial sanctions such as effluent charges or noncompliance penalties would be less prone to such delays.

58. Comments of Hon. J. Fraser, MP, in *Roundtable Discussion*, *supra*, note 16, p. 101.

59. A. Bryant, "An Analysis of the Ontario Water Resources Act," Elder, ed., *supra*, note 8, p. 165.

60. P. Emond, "A Critical Evaluation of the Environmental Protection Laws in the Maritime Provinces," Elder, ed., *supra*, note 8, p. 271.

61. C. Hunt, "Environmental Protection and the Public in the 1970s" (1978), 8:1 *Alternatives* 37, at pp. 38-39.

62. Economic Council of Canada, *Reforming Regulation*, *supra*, note 8, pp. 58-60. For an American example of the effectiveness of budget slashing in constraining even semi-independent agencies, see B. Hileman, "Conflict over EPA Budget" (1982), 16 *Environmental Science and Technology* 215A.

63. G. B. Doern, "The Canadian Regulatory Process," Doern, ed., *The Regulatory Process in Canada* (Toronto: Macmillan, 1978), pp. 20-21. This observation is also true of the Atomic Energy Control Board, and perhaps of other semi-independent regulatory bodies in Canada.

64. See *The Policy and Expenditure Management System* (Ottawa: The Privy Council Office, March 1981); R. Van Loon, "Stop the Music: The Current Policy and Expenditure Management System in Ottawa" (1981), 24 *Canadian Public Administration* 175. Such approvals are by no means automatic; for example, Health and Welfare Canada's director of finance indicated in May, 1983 that the department had unsuccessfully tried "for

about five years" to get funds to test 1,500 prescription drugs introduced before 1963. J. Defalco, "Health and Welfare wants $5 million to test products," *The Citizen*, May 28, 1983, p. 5.

Treasury Board has also rejected requests that Environment Canada be allowed to provide core funding to environmentalist organizations; see *infra*, note 119.

65. For a general description of the process of regulatory approval, see R. Anderson, "The Federal Regulation-Making Process and Regulatory Reform, 1969-1979," W. T. Stanbury, ed., *Government Regulation: Scope, Growth, Process* (Montreal: Institute for Research on Public Policy, 1980), pp. 153-170.

66. Quoted by Doern, *supra*, note 56, p. 54. The substance of these guidelines indicates the extent to which programs such as environmental protection have to fit into a set of priorities built around economic growth and effects on investment climate.

67. Gibson, *supra*, note 8, p. 4-41.

68. See Anderson, *supra*, note 65; for an example of how such constraints operate in practice see Victor and Burrell, *supra*, note 8, p. 62.

69. "Major" regulations are those which will impose total costs of $10 million or more in any one year, *or* "entail a sizeable potential adverse effect on specific groups or on technological progress, market structure and competition." See Treasury Board Canada, *Administrative Policy Manual*, Chapter 490, "Socio-Economic Impact Analysis" (Ottawa: December, 1979).

70. It is interesting that, although appeals accepted by the department as sufficiently serious to warrant creating a Board of Review stall the application of the regulation in question under the *Environmental Contaminants Act*, the same is *not* true under the *Hazardous Products Act*. See also *infra*, text accompanying notes 104-105.

71. Doern, *supra*, note 56, p. 20.

72. F. Howard's column "Bureaucrats," *The Citizen*, April 2, 1982, p. 4.

73. Memorandum as quoted in *ibid*.

74. A point emphasized by Doern, *supra*, note 29.

75. Comments of Robinson, *supra*, note 20, p. 52.

76. Felske, *supra*, note 8, p. 190.

77. W. Troyer, *No Safe Place* (Toronto: Clarke, Irwin, 1977), p. 88.

78. Although frequently encountered in the literature, this argument is perhaps best expressed by Wilson, "The Politics of Regulation," Wilson, ed., *supra*, note 39. On this issue of costs borne by firms versus costs borne by third parties (externalized or public costs), see Chapter Three.

79. Both limited financial resources and statutory limits on public participation may have a "chilling effect on group organization. It is highly unlikely that

individuals will support pressure-group activities unless they believe there is a reasonable probability of advancing their interests." F. Thompson and W. Stanbury, "The Political Economy of Interest Groups in the Legislative Process in Canada," in R. Schultz, ed., *The Canadian Political Process*, 3rd ed. (Toronto: Holt, 1979), p. 239.

80. Wilson, *supra*, note 78, p. 370.

81. *Ibid*. See also Keiser, *supra*, note 37; Sabatier, *supra*, note 34, p. 319.

82. Wilson, *ibid*.

83. S. Epstein, "Constraints on Decision-Making," in E. Hammond and I. Selikoff, eds., *Public Control of Environmental Health Hazards, 329 Annals of the New York Academy of Sciences* (New York, 1979).

84. Sabatier, *supra*, note 34, p. 338.

85. Rankin, *supra*, note 8; Castrilli, *supra*, note 8; T. McGarity and S. Shapiro, "The Trade Secret Status of Health and Safety Testing Information: Reforming Agency Disclosure Policies" (1980), 93 *Harvard Law Review* 837.

86. Rankin, *supra*, note 8, pp. 290-296.

87. *Ibid.*, pp 285-286, 290-292. Partial exceptions are provided in such provisions as article 118.4 of Québec's *Environment Quality Act*, R.S.Q., c. Q-2, which gives any person the right to obtain from the Ministère de l'environnement any available information regarding the quality, quantity and concentration of contaminants present in the environment.

88. Castrilli, *supra*, note 8, p. 362; Commission on Pacific Fisheries Policy, *Conflict and Opportunity*, interim report (Vancouver: the Commission, October 1981), p. 99; I. Mulgrew, "The Tussle for Alice Arm," *The Globe and Mail*, July 18, 1981, p. 10.

89. Neff, *supra*, note 53; see also his comments in the *Roundtable Discussion*, p. 66, and Business and Industry Advisory Committee to OECD, "Views of the BIAC Chemicals Sub-Group Regarding Some Aspects of Confidentiality," reproduced in Appendix C of *Roundtable Discussions*, *supra*, note 16.

90. "CCPA raises serious concerns about proposed government use of confidential information" (1982), 3:3 *Chem Events* 10 (Ottawa: Canadian Chemical Producers' Association), at pp. 10-11. The guidelines would have left final determination of the confidentiality of information up to the Environmental Protection Service, and operated on a presumption of information disclosure (within statutory limits, a crucial weakness). See Policy Branch, EPS, *EPS Policies and Guidelines on Confidential Information (CBI)*, Draft, February 1982.

91. Comments of E. Somers, Director-General, Environmental Health Directorate, Health and Welfare Canada, in *Roundtable Discussion*, *supra*, note 16, p. 77.

92. Canadian Environmental Law Association, *Submission on Draft EPS Policies and Guidelines on Confidential Business Information* (Toronto: CELA, mimeo, July 1982), pp. 3, 5.

93. *Access to Information Act*, S.C. 1980-81-82, c. 11, s. 20(1). For comments on the limitations of earlier versions of the *Act*, many of which appear to have survived in its final incarnation, see Rankin, *supra*, note 8, pp. 314-320; H. Mitchell, "Access to Information about Environmental Contaminants," reproduced as Appendix D of *Roundtable Discussion*, *supra*, note 16.

94. Lucas, *supra*, note 8, p. 74.

95. Swaigen and Carswell; Swaigen; Castrilli and Lax; Rankin; Gibson; Nemetz: *supra*, note 8.

96. See R. Cotton and P. Emond, "Environmental Impact Assessment," in Swaigen, ed., *supra*, note 8, at pp. 255-259. Similarly, Québec's *Environment Quality Act* R.S.Q., c. Q-2, allows the Minister to decide whether environmental impact assessment studies are satisfactory (Section 31.5), and whether or not a public request for a hearing on such studies is "frivolous" (Section 31.3).

97. Cotton and Emond, *ibid.*, pp. 251-255; W. Rees, *Reflections on the Environmental Assessment and Review Process* (Ottawa: Canadian Arctic Resources Committee, mimeo, November 1979).

98. On the rise of "ad hockery" in environmental decision making see Swaigen, *supra*, note 8, pp. 439-445.

99. For instance, the Mackenzie Valley Pipeline Inquiry under Justice Berger was able to sustain its broad approach to assessing pipeline impacts because of the minority government situation, the emergence of an alternative pipeline route, and the extensive public attention and media coverage it generated. This last factor, in turn, was no doubt related to a certain amount of "policy entrepreneurship" on the part of the Commissioner. See F. Bregha, *Bob Blair's Pipeline* (Toronto: James Lorimer, rev. ed., 1980).

100. Lucas, *supra*, note 8, p. 89.

101. Keating, *supra*, note 55.

102. M. Keating, "Ottawa Keeping Lid on Studies Justifying Use of 79 Pesticides," *The Globe and Mail*, April 28, 1981, p. 15.

103. Carswell and Swaigen, *supra*, note 8, p. 35. In an interesting acknowledgement of the ability of large and powerful polluters to delay action against them almost indefinitely by using this mechanism, the Ontario government responded to public pressure in 1980 by imposing emission controls on Inco Ltd. by special regulation under the Act — a procedure which is not subject to the same delays through appeal. See Gibson, *supra*, note 8, pp. 4-29 to 4-31. Québec's *Environment Quality Act* R.S.Q., c. Q-2, sections 96 and 99, similarly restricts the right of appeal from certain ministerial decisions to persons (including corporations) and municipalities directly involved in the decisions, and allows appeals to delay implementation of the decision.

104. Nemetz, *supra*, note 8, p. 124.

105. See commentary in *Canadian Employment Safety and Health Guide* (Don Mills, Ont.: CCH Canadian Ltd., 1982, 2 vols.), pp. 9105-9106, 9409-9410.

Other substances are governed by the application of guidelines assumed to be part of a general duty to take reasonable precautions to protect workers, but are not specifically enforceable.

106. Both the analysis and the specific examples are drawn from R. Presthus, *Elite Accommodation in Canadian Politics* (Toronto: Macmillan, 1973), pp. 212-216.

107. *Ibid.*, p. 213.

108. This tendency may be changing; however, the meetings between representatives of environmental non-governmental organizations and the Canadian Environmental Advisory Council (which in turn interacts with Ministry officials themselves) should be contrasted with the range of meetings which have to take place directly between senior officials of the department and industry — for instance, through government-industry task forces.

109. Two examples serve to illustrate this trend. In promoting its internal, non-statutory policy on information availability and consultation, Environment Canada has rejected statutory rights of public participation as "beyond the scope of consideration for ... DOE policy" without any further comment, has argued that national and regional annual meetings with environmental groups are a sufficient mechanism for public participation in priority setting, yet states that the information and consultation policy, "while assuring broad public *commentary* on any proposed regulation, recognizes the need for full *consultation* with affected industries." [emphasis added] *Questions and Answers about the Consultation Policy* (Ottawa: Environment Canada, 1982), pp. 5-7.

Lucas, *supra*, note 8, pp. 100-101, has noted that private prosecutions are virtually the only useful avenue of "public participation through the judicial system" in Canada. Environment Canada's Director of Legal Services has expressed alarm that the use of such prosecutions as a "crusader's tool" could disturb government's traditional exercise of prosecutorial discretion (presumably as a negotiating tool). See comments of M. Prabhu in *Roundtable Discussion*, *supra*, note 16, p. 112.

110. F. Thompson and W. Stanbury, "The Political Economy of Interest Groups in the Legislative Process in Canada," in R. Schultz, ed., *supra*, note 79, at p. 237; Sabatier, *supra*, note 34, at p. 319.

111. Coleman and Jacek, *supra*, note 22, pp. 36-37.

112. *Ibid.*, p. 34.

113. The most extensive and lucid statement of this phenomenon and its implications is M. Edelman, *The Symbolic Uses of Politics* (Urbana: University of Illinois Press, 1967).

114. D. Dewees, "Evaluation of Economic Policies for Regulating Environmental Pollution," Regulation Reference Working Paper No. 4 (Ottawa: Economic Council of Canada, 1980), p. 24.

115. Sabatier, *supra*, note 34, pp. 324-327, argues that regulatory agencies themselves can take an activist approach to developing supportive constituencies for their programs and approaches. This strategy might face

serious constraints in the Canadian context, as a result of the influences described *supra* in the text accompanying notes 62-77.

116. K. Engelhart and M. Trebilcock, "Public Participation in the Regulatory Process: The Issue of Funding," Regulation Reference Working Paper No. 17 (Ottawa: Economic Council of Canada, 1981), recount a number of experiments with intervenor funding including those of the Berger Inquiry and of Consumer and Corporate Affairs Canada; see also recommendation of EARP panels cited by Cotton and Emond, *supra*, note 96, p. 267.

117. Economic Council of Canada, *Responsible Regulation*, *supra*, note 8, p. 82.

118. See the comments of J. Hay (CEO, Dow Chemical of Canada Ltd.) in Peterson Committee, *Minutes of Proceedings* 13, October 9, 1980, p. 21, and of the Canadian Manufacturers' Association (which argued that such funding would run counter to the government's policies of fiscal restraint), in PCB Board of Review, *supra*, note 17, p. 197.

119. Prabhu, *supra*, note 109, p. 41; see also Canadian Environmental Advisory Council, *Report of a Meeting between the Public Interest Groups and the Canadian Environmental Advisory Council, May 26-27, 1980*, CEAC Report No. 9 (Ottawa: Environment Canada, 1981), p. 9.

120. Engelhart and Trebilcock, *supra*, note 116.

121. Swaigen, *supra*, note 8, p. 467.

122. One of the few Canadian departmental officials to have acknowledged this point is George Post, Deputy Minister of Consumer and Corporate Affairs Canada; see his comments in Peterson Committee, *Minutes of Proceedings* 5, September 23, 1980, pp. 19-20.

123. See Presthus, *supra*, note 106, pp. 127-128.

124. W. Connolly, "Appearance and Reality in Politics" (1979), 7 *Political Theory* 445, at pp. 456-458.

125. See C. Lindblom, *Politics and Markets* (New York: Basic Books, 1977), pp. 170-221; R. Miliband, *The State in Capitalist Society* (London: Quartet, 1969).

126. R. Mahon, "Canadian Public Policy: The Unequal Structure of Representation," in L. Panitch, ed., *The Canadian State: Political Economy and Political Power* (Toronto: University of Toronto Press, 1977), pp. 182-189.

127. Science Council of Canada, *Regulating the Regulators: Science, Values and Decisions*, Report No. 35 (Ottawa: Science Council, 1982), pp. 11-13.

128. Franson, *supra*, note 30, pp. 51-59.

129. The term "immobilization" is used by Keiser, *supra*, note 37, p. 482, and defined as "a phenomenon which does not render the agency completely motionless, but which constrains its freedom of action and reduces its pace of operation to a form of protracted incrementalism."

130. T. Page, "A Generic View of Toxic Chemicals and Similar Risks" (1979), 7 *Ecology Law Quarterly* 207.

131. T. Page, "A Framework for Unreasonable Risk in the Toxic Substances Control Act (TSCA)," W. Nicholson, ed., *Management of Assessed Risk for Carcinogens*, 363 *Annals of the New York Academy of Sciences* (New York, 1981).

132. *Ibid.*, p. 148.

133. *Ibid.*

134. C. Muir, "Limitations and Advantages of Epidemiological Investigations in Environmental Carcinogenesis," in Hammond and Selikoff, eds., *supra*, note 83.

135. *Ibid.*, p. 160.

136. The AIHC position as described in T. Maugh II, "Chemical Carcinogens: The Scientific Basis for Regulation" (1978), 201 *Science* 1200, at p. 1203.

137. Page, *supra*, note 130, at pp. 208-209.

138. W. Jaeschke, "Anatomy of Unreasonable Risk," in Nicholson, ed., *supra*, note 131, at p. 50.

139. This argument is implicit in arguments about the risks imposed by nuclear power made by H. Bethe, "The Necessity of Fission Power" (1976), 234:1 *Scientific American* 21. It is made explicit in the nuclear context by E. Siddall, *Nuclear Safety in Perspective*, presented at the Canadian Nuclear Association annual meeting, 1979 (Toronto: Canatom Ltd., 1979) and in a more general context by, among others, A. Etzioni, "Choose America Must," *Across the Board* (New York: The Conference Board, October, 1980); A. Wildavsky, "No Risk Is the Highest Risk of All" (1979), 67 *American Scientist* 32; A. Wildavsky, "Richer Is Safer" (1980), 60 *The Public Interest* 23; A. Wildavsky, "Wealthier Is Healthier," *Regulation*, Jan./Feb. 1980, at p. 10.

140. See S. Jellinek, "On the Inevitability of Being Wrong," in Nicholson, ed., *supra*, note 131; and OSHA policy statements quoted in B. Cottine, "Public Health Decision-Making and the U. S. Legal Process: Regulation of Vinyl Chloride," in Hammond and Selikoff, eds., *supra*, note 83.

141. B. Paigen, "Controversy at Love Canal," *Hastings Center Report*, June 1982, p. 32.

142. An example of how industry articulated this position in a specific regulatory context is provided by Gillespie, "Carcinogenic Risk Assessment in the United States and Great Britain: The Case of Aldrin/Dieldrin" (1970), 9 *Social Studies of Science* 265, at p. 271.

143. Muir, *supra*, note 134; I. Selikoff, "Practical Questions for Practical Politicians,"F. Sterrett and B. Rosenberg, eds., *Science and Public Policy II, Annals of the New York Academy of Sciences* 387 (New York, 1982).

144. A brief history of the asbestos issue was provided in an earlier version of this Paper, but has been deleted because of space limitations. The reader should consult: *Asbestos-Related Occupational Diseases*, Hearings before the Subcommittee on Compensation, Health and Safety, Committee on

Education and Labor, House of Representatives, U. S. Congress, 95th Cong., 2nd sess. (Washington, D.C.: U. S. Government Printing Office, 1979), pp. 25-128; G. B. Doern, "The Political Economy of Regulating Occupational Health: The Ham and Beaudry Reports" (1977), 20 *Canadian Public Administration* 1; D. Kotelchuck, "Asbestos Research," Health/PAC Bulletin No. 61 (November/December 1974); L. Tataryn, *Dying for a Living* (Ottawa: Deneau and Greenberg, 1979), pp. 15-60; W. Nicholson, "Regulatory Actions and Experiences in Controlling Exposure to Asbestos in the United States," *supra*, note 83, at p. 293.

Employers in most Canadian jurisdictions are allowed to expose their workers to up to two fibres of asbestos over five microns in length per cubic centimetre of air. These exposures are 20 times the allowable maximum of 0.1 fibre/cc. recommended by the U. S. National Institute for Occupational Safety and Health in 1977, as cited by W. Nicholson, *ibid*.

145. IARC Working Group, "An Evaluation of Chemicals and Industrial Processes Associated with Cancer in Humans Based on Animal Data: IARC Monographs Volumes 1 to 20" (1980), 40:1 *Cancer Research* 1.

146. AIHC position cited in U. S. Congressional Office of Technology Assessment (OTA), *Assessment of Technologies for Determining Cancer Risks from the Environment* (Washington, D. C.: U.S. Government Printing Office, 1981), pp. 126-127; see also Shell Chemical's position in the U. S. hearings on Aldrin/Dieldrin, cited by Gillespie, *supra*, note 142, p. 271.

147. Page, *supra*, note 131, p. 162.

148. This argument was used by Shell Chemical in the Aldrin/Dieldrin case; see Gillespie, *supra*, note 142, at p. 271; on the issue of hypersusceptibility more generally, see Office of Technology Assessment, *supra*, note 146, pp. 126-127.

149. M. Schneiderman, "Regulation of Carcinogens in an Imprecise World," Nicholson, ed., *supra*, note 131, at p. 226.

150. See: U. S. Council on Environmental Quality, *Environmental Quality 1979* (Washington, D. C.: U. S. Government Printing Office, 1980), p. 209, for a succinct explanation of the rationale behind testing at high doses.

151. OTA, *supra*, note 146, pp. 162-163.

152. OTA, *ibid*., p. 170: "The choice of scaling factor can make a difference of up to fortyfold in estimating human risks."

153. Schneiderman, *supra*, note 149.

154. *Ibid*.; U. S. National Research Council, *Risk Assessment in the Federal Government: Managing the Process* (Washington, D. C.: National Academy Press, 1983), p. 35.

155. A concise and readable summary of controversies over dose-response relationships is presented by T. Maugh II, "Chemical Carcinogens: How Dangerous Are Low Doses?" (1978), 202 *Science* 37.

156. M. Schneiderman, "Thresholds for Environmental Cancer: Biologic and Statistical Considerations," in Hammond and Selikoff, eds., *supra*, note 83, p. 126.

157. Office of Technology Assessment, *supra*, note 146, pp. 167-169.

158. Maugh, *supra*, note 155.

159. Even a scientific consensus on such issues as the proper theory of cancer causation on which to base dose-response models would not, of course, mean that the consensus point of view represented a "right" answer.

160. D. Rall, "Validity of Extrapolation of Results of Animal Studies to Man," in Hammond and Selikoff, eds., *supra*, note 83.

161. See for instance David Rall as quoted by Maugh, *supra*, note 155, at p. 41.

162. Schneiderman, *supra*, note 149, p. 228.

163. *Health Effects of Toxic Pollutants: A Report from the Surgeon-General and a Brief Review of Selected Environmental Contamination Incidents with a Potential for Health Effects*, prepared for Committee on Environment and Public Works, U. S. Senate (Committee Print 96-15), 96th Cong., 2nd Sess. (Washington, D.C.: U. S. Government Printing Office, 1980), pp. 133-138.

164. International Reference Group on Great Lakes Pollution from Land Use Activities (PLUARG), International Joint Commission, *Environmental Management Strategy for the Great Lakes System* (Windsor: IJC, 1978), pp. 44-46.

165. IARC Working Group, *supra*, note 145, at p. 2.

166. R. Griesemer and C. Cueto, "Toward a Classification Scheme for Degrees of Experimental Evidence for the Carcinogenicity of Chemicals for Animals," R. Montesano, ed., *Molecular and Cellular Aspects of Carcinogen Screening Tests* (Lyon , France: International Agency for Research on Cancer, 1980), p. 264.

167. See for instance Jaeschke, *supra*, note 138.

168. See C. Taylor, "Neutrality in Political Science" and W. Connolly, "Theoretical Self-Consciousness," in W. Connolly and G. Gordon, eds., *Social Structure and Political Theory* (Lexington, MA: D. C. Heath, 1974).

169. B. Sabey and H. Taylor, "The Known Risks We Run: The Highway," in R. Schwing and A. Albers, eds., *Societal Risk Assessment: How Safe Is Safe Enough?* (New York: Plenum, 1980).

170. Paigen, *supra*, note 141, pp. 30-31.

171. The debate has been summarized by A. Lovins, *Is Nuclear Power Necessary?* (London: Friends of the Earth, 1979) and Lovins, "Re-Examining the Nature of the ECE Energy Problem" (September 1979), *Energy Policy* 178.

172. Kotelchuck, *supra*, note 144.

173. B. Martin, *The Bias of Science* (Canberra: Scientists for Social Responsibility in Science, 1979), pp. 62-63.

174. *Ibid.*, pp. 37-55.

175. A study cited by Shell Chemical in support of its contention that Aldrin/Dieldrin was not carcinogenic involved roughly 1000 workers only 69 of whom had been exposed for more than ten years and observed for 15 years. See Gillespie, *supra*, note 142, at p. 269 and S. Epstein, *The Politics of Cancer* (San Francisco: Sierra Club Books, 1978), pp. 260-261.

176. An industry-sponsored epidemiological study of asbestos workers in Québec included many workers with only limited or recent exposure; on the basis of this study, the Québec Asbestos Mining Association claimed:

> Can a little bit of asbestos kill you? No, long term medical studies of workers who are exposed to asbestos show that low to moderate levels of exposure do not lead to an increased rate of disease. In these studies, higher than normal incidence of disease was found only among employees exposed to extremely high asbestos concentrations for long periods of time.

The nature of the sample was only one area of controversy in this study. The way in which worker X-rays were interpreted in this study, in contrast to the interpretations in another study without industry support, was another. The QAMA pamphlet is quoted by S. Epstein, in "Debate: Resolved That There Should Be No Preventable Exposure to a Confirmed Occupational Human Carcinogen," in Hammond and Selikoff, eds., *supra*, note 83. On the controversies surrounding asbestos research, see Kotelchuck, *supra*, note 144; Tataryn, *supra*, note 144.

177. N. Wade, "Dow Redefines Word It Doesn't Like" (1972), 176 *Science* 262.

178. M. Reuber, "Review of Toxicity Test Results Submitted in Support of Pesticide Tolerance Petitions" (1978), 9 *Science of the Total Environment* 135.

179. Epstein, *supra*, note 83.

180. A. Lisook, Chief, Clinical Investigntions Branch, Bureau of Drugs, U. S. FDA, "FDA Audit of Drug Investigators and Sponsors," presented at Drug Information Workshop, Williamsburg, Va. (Rockville MD: U. S. FDA, mimeo, December 1981).

181. See Doern, *supra*, note 56, p. 44; D. Chant and R. Hall, *Ecotoxicity: Responsibilities and Opportunities*, Report No. 8 (Ottawa: Canadian Environmental Advisory Council, Environment Canada, 1979), p. 17.

182. Although the U. S. Manufacturing Chemists' Association knew in 1972 about European experimental results strongly indicating the carcinogenicity of vinyl chloride, it did not provide the information to U.S. regulatory authorities until 1974, when the cancer deaths of exposed American workers were revealed. J. T. Edsall, "Scientific Freedom and Responsibility" (1975), 188 *Science* 687, at p. 690.

183. S. Ungar, "Get Away with What You Can," in R. Heilbroner, ed., *In the Name of Profit* (Garden City, N.J.: Doubleday, 1973) (on MER-29); Sunday Times Insight Team, *Suffer the Children: The Story of Thalidomide*

(London: André Deutsch, 1979); M. Dowie and C. Marshall, "The Bendectin Cover-Up," M. Ermann and R. Lundman, eds., *Corporate and Governmental Deviance*, 2nd ed., (New York: Oxford, 1982); Testimony of S. M. Wolfe, M.D. (Public Citizen Health Research Group) before Subcommittee on Crime, House Judiciary Committee, U. S. Congress, February 4, 1980 and attachments (on Selacryn); P. Sobel and J. Zackey, "Selacryn: A Tale of Negligence and Concealment" (1980), 16:10 *Trial* 16; R. Smith, "Creative Penmanship in Animal Testing Prompts FDA Controls" (1977), 198 *Science* 1227.

184. Ungar, *ibid.*; Smith, *ibid.*

185. J. Hollobon and D. Lipovenko. "Many Drugs Haven't Passed Modern Tests," *The Globe and Mail*, October 18, 1982, p. 5.

186. Lax, *supra*, note 46; R. Howard, *Poisons in Public* (Toronto: James Lorimer, 1980), pp. 96-130.

187. Tataryn, *supra*, note 144, pp. 107-153. On the treatment of scientific evidence in this context, it is interesting to note that Tataryn (p. 119) quotes Health and Welfare Canada's medical officer for the Northwest Territories as saying that: "There has been some publicity given recently to the possibilities of long-term arsenic exposure being related to an increase in carcinoma and cancer [sic]. I would say that this is still rather doubtful." However, a 1976 review of studies on arsenic concluded that: "From 1948 to 1975, nine out of eleven epidemiological studies have shown, initially or upon review, significant excess mortality from respiratory cancer among diverse occupations exposed to various inorganic arsenicals." Two of those studies also showed excess mortality from cancers at other sites. See H. Blejer and W. Waner, "Case Study 4: Inorganic Arsenic — Ambient Level Approach to the Control of Occupational Carcinogenic Exposures," in U. Saffiotti and J. Wagoner, eds., *Occupational Carcinogenesis*, 271 *Annals of the New York Academy of Sciences* (New York, 1976).

188. Environment Canada, *The Clean Air Act: Compilation of Regulations and Guidelines*, EPS 1-AP-81-1 (Ottawa: Air Pollution Control Directorate, Environment Canada, April 1981).

189. Howard, *supra*, note 186, pp. 43-70; K. Lie, "The Spruce Budworm Controversy in New Brunswick and Nova Scotia" (1980), 9:2 *Alternatives* 5.

190. *E.g.* J. Crocker, "Insecticide and Viral Interaction as a Cause of Fatty Visceral Changes and Encephalopathy in the Mouse," *Lancet*, July 6, 1974; J. Crocker, "Lethal Interaction of Ubiquitous Insecticide Carriers with Virus" (1976), 192 *Science* 1351; and more recent research summarized in K. Rozee, "Is a Compromised Interferon Response an Etiologic Factor in Reye's Syndrome?" (1982), 126 *Canadian Medical Association Journal* 798. Rozee also notes (at p. 798) that:

> In Atlantic Canada the distribution of cases of Reye's syndrome has in previous years been found to coincide geographically with forested areas that have been sprayed every growing season since 1952. ... The populace of neighbouring unsprayed forests had, and still has, a significantly lower incidence of this syndrome than the populace of the sprayed area.

191. *Proceedings of a Symposium on Fenitrothion: The Long-term Effects of Its Use in Forest Ecosystems*, NRCC 16073 (Ottawa: National Research Council, 1977), comments of P. D. McTaggart-Cowan, chairman of the NRCC panel, pp. 574-577.

192. Environmental Hearing Board, *Public Hearing on Lead Contamination in the Metropolitan Toronto Area* (Toronto: Ontario Ministry of the Environment, 1976), p. 23. The panel did, however, endorse an industry recommendation for (predictably!) more research (p. 29).

193. *Ibid.*, pp. 163-164.

194. See J. Primack and F. von Hippel, *Advice and Dissent: Scientists in the Political Arena* (New York: New American Library, 1974). A content analysis of Congressional testimony on arms control and disarmament has found that government scientists' views more closely resemble those of other, non-scientist government personnel than they do those of scientists outside government, suggesting that the priorities of the organizational environment may have important effects on the conceptual frameworks used by scientists in government service. M. Keren, "Science vs. Government: A Reconsideration" (1980), 12 *Policy Sciences* 333, at pp. 333-353.

195. Gillespie, *supra*, note 142.

196. *Ibid.*, pp. 281-283.

197. *Ibid.*, p. 268.

198. *Ibid.*, p. 289.

199. *Ibid.*, p. 283; see also Thompson and Stanbury, *supra*, note 110, at p. 236.

200. *E.g.*, B. Finamore and E. Simpson, "Ambient Air Standards for Lead and Ozone: Scientific Problems and Economic Pressures" (1979), 3 *Harvard Environmental Law Review* 261.

201. See D. Bazelon, "Risk and Responsibility" (1979), 205 *Science* 277.

202. This phrase is taken from G. Allison, *Essence of Decision* (Boston: Little, Brown, 1971), p. v.

203. A "positive externality," conversely, is a benefit created for non-participating parties as a result of a particular set of transactions, for which the creator cannot realistically charge.

204. P. Victor, "Economics and the Challenge of Environmental Issues," in Leiss, ed., *supra*, note 3, pp. 36-37. A much more extensive treatment of the issue of environmental pollution as external cost is provided by K. W. Kapp, *The Social Costs of Private Enterprise*, rev. ed. (New York: Schocken, 1971).

205. R. Ayres and A. Kneese, "Production, Consumption and Externalities" (1969), 59 *American Economic Review* 282.

206. K. W. Kapp, "Environmental Disruption: Challenge to Social Science," in Kapp, *Environmental Policies and Development Planning in Contemporary*

China and Other Essays, Environment and Social Sciences 4 (Paris/the Hague: Mouton, 1972), p. 60.

207. R. Haveman and G. Christainsen, "Environmental Regulations and Productivity Growth," in H. Peskin, ed., *Environmental Regulation and the U. S. Economy* (Baltimore: Johns Hopkins University Press for Resources for the Future, 1981), pp. 60 and 75; see generally pp. 60-61, 73-75.

208. D. Dewees, "Economic Considerations in the Selection of Pollution Control Legislation" (1972), 10 *Osgoode Hall Law Journal* 627, at p. 632.

209. See H. Macaulay and B. Yandle, *Environmental Use and the Market* (Lexington, MA: D. C. Heath, 1977); R. Coase, "The Problem of Social Cost" (October 1960), 3 *Journal of Law and Economics* 1.

210. W. Baumol and W. Oates, *Economics, Environmental Policy and Quality of Life* (Englewood Cliffs, NJ: Prentice-Hall, 1979), pp. 45-57 (a review of health effects of major pollutants); *Health Effects, supra*, note 163.

211. See the summary of studies on this topic compiled by the American Lung Association and reproduced in *Health Effects, ibid.*, pp. 162-169.

212. See conclusions of the International Agency for Research on Cancer as reproduced in OTA, *supra*, note 146, at p. 141; *Health Effects, supra*, note 163, pp. 184-212.

213. D. Bryce-Smith, "Mental Health Effects of Lead on Children" (May/June 1978), 7 *Ambio* 192; U. S. Council on Environmental Quality, *supra*, note 40, pp. 208-210 and references there cited.

214. A. Levine, *Love Canal: Science, Politics and People* (Lexington, MA: D. C. Heath, 1981); R. Mokhiber and L. Shen, "Love Canal," in R. Nader, ed., *Who's Poisoning America?* (San Francisco: Sierra Club Books, 1981).

215. C. B. Kelly, "Kepone," Nader, ed., *ibid.*; *Corporate Crime*, Subcommittee on Crime, House of Representatives Committee on the Judiciary, U. S. Congress (Committee Print No. 10), 96th Cong., 2nd Sess. (Washington, D. C.: U. S. Government Printing Office, 1980), pp. 11-14.

216. Troyer, *supra*, note 77.

217. Tataryn, *supra*, note 144, pp. 106-153.

218. T. Dickinson, "Reflections in an Orbiting Eye" (May/June 1982), 1:3 *Equinox* 58.

219. International Joint Commission Committee on the Assessment of Human Health Effects of Great Lakes Water Quality, *1981 Annual Report* to the Great Lakes Water Quality Board (Windsor: IJC, 1981), pp. 8-10. Airborne deposition rather than direct discharge has been identified as an important route by which many such chemicals enter the Lakes; see IJC Great Lakes Science Advisory Board, *1980 Annual Report: A Perspective on the Problem of Hazardous Substances in the Great Lakes Basin Ecosystem* (Windsor: IJC, 1980), pp. 23-25; S. Eisenreich, "Airborne Organic Contaminants in the Great Lakes Ecosystem" (1981), 15 *Environmental Science and Technology* 30.

220. D. Burmaster, "The New Pollution: Groundwater Contamination" (1982), 24:2 *Environment* 6; J. O'Hara, "Don't Drink the Water," *Maclean's*, June 22, 1981, p. 26; U. S. Council on Environmental Quality, *Environmental Quality 1981* (Washington, D. C.: U. S. Government Printing Office, 1982), pp. 65-71.

221. U. S. CEQ, *supra*, note 40, p. 134.

222. G. Wright, "The Cost-Internalization Case for Class Actions," Research and Development Corporation (RADCO), *Environmental Law* (Greenvale, NY: RADCO, 1970); Carswell and Swaigen, *supra*, note 8, pp. 421-422, 460-465.

223. Baumol and Oates, *supra*, note 210, p. 216; D. Large and P. Michie, "Proving that the Strength of the British Navy Depends on the Number of Old Maids in England: A Comparison of Scientific Proof with Legal Proof" (1981), 11 *Environmental Law* 555; Lax, *supra*, note 46, pp. 63-64; Carswell and Swaigen, *supra*, note 8, pp. 477-479.

224. G. Morley, "The Legal Framework for Public Participation in Canadian Water Management," in Elder, ed., *supra*, note 8, pp. 57-58; Carswell and Swaigen, *supra*, note 8, pp. 23-24.

225. This means, obviously, that industry (like any other rich defendant) has the upper hand in litigation. The practice of awarding corporate defendants' legal costs against unsuccessful plaintiffs clearly constitutes another major obstacle for civil suits. See H. Laskey, "Stakes Are High in Spray Battle," *The Globe and Mail*, March 5, 1983.

226. See *supra*, note 59, and accompanying text.

227. D. W. Pearce, *Environmental Economics* (London: Longman, 1976), pp. 70-72.

228. N. Rescher, "Economics versus Moral Philosophy: The Pareto Principle as a Case Study" in Rescher, *Unpopular Essays in Technological Progress* (Pittsburgh: University of Pittsburgh Press, 1980), p. 69.

229. A. Kneese, *Economics and the Environment* (New York: Penguin, 1977), p. 20. Hence a market which is functioning perfectly, on the basis of perfect information and in which all the participants are acting as utility-maximizers will achieve Pareto optimality.

230. See C. B. Macpherson, *The Political Theory of Possessive Individualism* (New York: Oxford, 1962); Macpherson, "Democratic Theory: Ontology and Technology" and "Market Concepts in Political Theory," in *Democratic Theory: Essays in Retrieval* (London: Oxford, 1973); M. Sagoff, "At the Shrine of Our Lady of Fatima or Why Political Questions Are Not All Economic" (1981), 23 *Arizona Law Review* 1283.

231. J. Vaupel, "On the Benefits of Health and Safety Regulation," A. Ferguson and P. LeVeen, eds., *The Benefits of Health and Safety Regulation* (Cambridge, MA: Ballinger, 1981), p. 5.

232. A. M. Freeman, *The Benefits of Environmental Improvement: Theory and Practice* (Baltimore: Johns Hopkins University Press for Resources for the Future, 1979), pp. 54-57.

233. Pearce, *supra*, note 227, p. 27.

234. Macaulay and Yandle, *supra*, note 209, p. 49.

235. For discussion of such policy instruments, see Anderson, *supra*, note 57; Baumol and Oates, *supra*, note 210, pp. 217-366; Dewees, *supra*, notes 114 and 208; Kneese, *supra*, note 229, pp. 153-168; Pearce, *supra*, note 227, pp. 73-105; J. del C. y Gonzalez, "Markets in Air: Problems and Prospects of Controlled Trading" (1981), 5 *Harvard Environmental Law Review* 377.

236. G. Calabresi and P. Bobbitt, *Tragic Choices* (New York: W. W. Norton, 1977), especially pp. 32-41.

237. E. Grush and C. Saunby, "Fatalities Associated with Crash-Induced Fuel Leakage and Fires," Ford Motor Company report reproduced in V. Kirsch, "Ford Pinto and Mercury Bobcat Fires," in M. Barzelay, ed., *Scientific Automobile Accident Reconstruction*, vol. 3 (New York: Matthew Bender, 1980), pp. 27-72.28 — 27-72.87.

238. Transcript of *Grimshaw and Gray* vs. *Ford Motor Co.*, Superior Court for Orange County, Santa Ana, CA, October 23, 1977, A25.2, pp. 65-70. See also M. Dowie, "Pinto Madness," *Mother Jones*, September-October 1977; L. Strobel, *Reckless Homicide? Ford's Pinto Trial* (South Bend, Indiana: AND Books, 1980), especially documents reprinted at pp. 275-285.

239. Grush and Saunby, *supra*, note 237, pp. 27-72.85 — 27-72.86.

240. Pearce, *supra*, note 227, p. 9.

241. Executive Order 12,291, February 1981, as cited by M. Sagoff, "Economic Theory and Environmental Law" (1981), 79 *Michigan Law Review* 1393, at p. 1419.

242. Treasury Board of Canada, *supra*, note 69, Chapter 490, p. 13. To Treasury Board's credit, it acknowledges many of the limitations of the methodology of CBA discussed later in the present chapter.

243. R. Crandall, "Prepared Statement," in *Use of Cost-Benefit Analysis by Regulatory Agencies*, Joint Hearings before Subcommittee on Oversight and Investigations and Subcommittee on Consumer Protection and Finance, Committee on Interstate and Foreign Commerce, U. S. House of Representatives (hereinafter *CBA Hearings*), 96th Cong., 1st Sess. (Washington, D. C.: U. S. Government Printing Office, 1980), p. 57.

244. Committee on Environmental Decision-Making, National Research Council, *Decision-Making in the Environmental Protection Agency*, vol. 2 (Washington, D. C.: National Academy of Sciences, 1979), pp. 51-53.

245. G. Rohlich and R. Howe, "The Toxic Substances Control Act: Overview and Evaluation," Regulation Reference Working Paper 21 (Ottawa: Economic Council of Canada, 1981), pp. 118-147.

246. N. Ashford, *Environmental/Safety Regulation and Technological Change in the U. S. Chemical Industry*, Appendices (Cambridge, MA: Centre for Policy Alternatives, Massachusetts Institute of Technology, 1979), pp. C-2 - C-10; Epstein, *supra*, note 175, pp. 105-106.

247. U. S. CEQ, *supra*, note 40, pp. 396-399.

248. See comments of N. Ashford, *CBA Hearings*, *supra*, note 243, p. 67. Another example: it would have been prohibitively expensive, if not impossible, to meet the automobile pollution standards set for the end of the 1970s with the technology available at the beginning of the decade when the standards were imposed. However, despite extensive initial industry opposition, the necessary technology was developed and applied. E. Seskin, "Automobile Air Pollution Policy," in Portney, ed., *Current Issues in U. S. Environmental Policy* (Baltimore: Johns Hopkins University Press for Resources for the Future, 1978).

249. P. Portney, "The Macroeconomic Impacts of Federal Environmental Regulation," in Peskin, ed., *supra*, note 207, p. 28.

250. M. Weidenbaum, "Benefit-Cost Analysis of Government Regulations," in *CBA Hearings*, *supra*, note 243, pp. 330-331.

251. See G. Eads, "The Benefits of Better Benefits Estimation," Ferguson and LeVeen, eds., *supra*, note 231, p. 44.

252. *Cf.* Weidenbaum, *supra*, note 250, p. 338: "The underlying aim of benefit-cost analysis, therefore, is to maximize the real value of the social income, usually measured by the GNP."

253. See *supra*, note 252; R. Posner, "Utilitarianism, Economics and Legal Theory" (1979), 8 *Journal of Legal Studies* 103, especially pp. 119-135.

254. N. Ashford, *Benefits of Environmental, Health and Safety Regulation*, prepared for Committee on Governmental Affairs, U. S. Senate, 96th Cong., 2nd Sess. (Washington, D. C.: U. S. Government Printing Office, 1980), pp. 11-13.

255. P. Gold, ed., *Acid Rain: A Transjurisdictional Problem in Search of a Solution* (Buffalo: Canadian-American Center, State University of New York, 1982).

256. Subcommittee on Oversight and Investigations, Committee on Interstate and Foreign Commerce, U. S. House of Representatives, *Report: Regulatory Reform*, 94th Cong. 2nd Sess. (Washington, D. C.: U. S. Government Printing Office, 1976), p. 180.

257. D. Nelkin, "Science, Technology and Political Conflict: Analyzing the Issues," in Nelkin, ed., *Controversy: Politics of Technical Decisions* (Beverley Hills, CA: Sage, 1979), p. 16.

258. See H. Peskin and E. Seskin, "Introduction and Overview," in Peskin and Seskin, eds., *Cost-Benefit Analysis and Water Pollution Policy* (Washington, D. C.: The Urban Institute, 1975), p. 3. This article provides a concise (and widely cited) introduction to the principles underlying CBA.

259. Freeman, *supra*, note 232, at pp. 153-162; P. Portney, "Housing Prices, Health Effects, and Valuing Reductions in Risk of Death" (1981), 9 *Journal of Environmental Economics and Management* 72.

260. Freeman, *ibid.*, pp. 195-233. In many benefit studies of water pollution control this is the most important category of benefits: see D. Tihansky, "A Survey of Empirical Benefit Studies," in Peskin and Seskin, eds., *supra*, note 258.

261. F. Handy, "Income and Air Quality in Hamilton, Ontario" (1977), 6:3 *Alternatives* 18, W. Kruvant, "People, Energy and Pollution," in D. Newman and D. Day, eds., *The American Energy Consumer* (Cambridge, MA: Ballinger, 1975); F. Muller, "Distribution of Air Pollution in the Montreal Region" (1977), 3 *Canadian Public Policy* 199.

The fact that the poor are disproportionately victimized by air pollution does *not* necessarily mean that they will be the greatest net beneficiaries of pollution abatement programs, once one considers the incidence of the costs of abatement (in terms of increased product prices, energy costs, and so forth).

262. K. W. Kapp, "Social Costs, Neo-Classical Economics, and Environmental Planning: A Reply," *Political Economy of Environment: Problems of Method, Environment and Social Sciences* 2 (Paris/the Hague: Mouton, 1971), p. 120.

263. Freeman, *supra*, note 232, pp. 169-171.

264. *Ibid.*, p. 170, citing results from a study which actually reached this conclusion.

265. J. Graham and J. Vaupel, "Value of a Life: What Difference Does It Make?" and W. Schulze and A. Kneese, "Risk in Benefit-Cost Analysis" (1981), 1 *Risk Analysis* 89 and 81.

266. Graham and Vaupel, *ibid.*

267. *Ibid.*

268. J. Bishop and C. Cicchetti, "Some Institutional and Conceptual Thoughts on the Measurement of Indirect and Intangible Benefits and Costs," in Peskin and Seskin, eds., *supra*, note 258, p: 121.

269. See T. Page, *Conservation and Economic Efficiency* (Baltimore: Johns Hopkins University Press for Resources for the Future, 1977), p. 152-155.

270. For example, at a 10 per cent real discount rate (the rate specified by Treasury Board for cost-benefit calculations for SEIA purposes) the present value of a $1 benefit which is not realized until twenty years hence is only 15 cents. This twenty-year span is well within the latency period of some occupational and environmental carcinogens.

271. N. Ashford, "The Usefulness of Cost-Benefit Analysis in Decisions Concerning Health, Safety and the Environment," *CBA Hearings*, *supra*, note 243, p. 83.

272. E. Mishan, "Distributive Implications of Economic Controls," in Ferguson and LeVeen, eds., *supra*, note 231.

273. National Research Council, *supra*, note 244, p. 238.

274. Kapp, "Social Costs," *supra*, note 262, pp. 119-123.

275. See G. Wright, "The Cost-Internalization Case for Class Actions," Research and Development Corporation (RADCO), *Environmental Law* (Greenvale, NY: RADCO, 1970), pp. 234-235.

276. They can also "continue their conduct until sued" or otherwise sanctioned. J. Krier, "Environmental Litigation and the Burden of Proof," in M. Baldwin and J. Page, Jr., eds., *Law and the Environment* (New York: Walker & Co., 1970), p. 107.

277. A. Lovins, "Cost-Risk-Benefit Assessments in Energy Policy" (1977), 45 *George Washington Law Review* 911, at p. 929.

278. G. Vickers, *Freedom in a Rocking Boat* (Harmondsworth, Midd.,: Penguin, 1972), p. 151.

279. K. Bogen, "Public Policy and Technological Risk" (1980), 21:1 *IDEA: The Journal of Law and Technology* 37, at p. 56.

280. B. Fisse, *The Retributive Punishment of Corporations* (1981, unpublished MS on file with the Protection of Life Project, Law Reform Commission of Canada), p. 32.

281. Sagoff, *supra*, note 241.

282. Crandall, *supra*, note 243, p. 56. For a similar argument, see W. Beckerman, "Environmental Policy and the Challenge to Economic Theory," in *Political Economy of Environment*, *supra*, note 262, at p. 109.

283. J. C. Miller III, "Prepared Statement," in *CBA Hearings*, *supra*, note 243, p. 366.

284. Comments in *CBA Hearings*, *supra*, note 243, p. 90.

285. See L. Tribe, "Policy Science: Analysis or Ideology" (1972), 2:2 *Philosophy and Public Affairs* 66, at pp. 79-83.

286. Successively higher estimates of the cost of an Army Corps of Engineers dam in Wisconsin led the Corps to inflate its benefit estimates and valuations to the point where they implied that the entire population of Minneapolis would be water-skiing every weekend on the lake the dam would create. See Large and Michie, *supra*, note 223, p. 624.

287. *E.g.*, B. Fischhoff, "Cost-Benefit Analysis and the Art of Motorcycle Maintenance" (1977), 8 *Policy Sciences* 177, at pp. 194-196.

288. W. Schulze, "Ethics, Economics and the Value of Safety," in Schwing and Albers, eds., *supra*, note 169.

289. Reschenthaler, *supra*, note 33, p. 9.

290. R. Thaler and S. Rosen, "The Value of Saving a Life: Evidence from the Labor Market," in N. Terleckyj, ed., *Household Production and Consumption* (New York: National Bureau of Economic Research, 1975); W. Viscusi, "Labor Market Valuations of Life and Limb" (1978), 26 *Public Policy* 359.

291. See Reschenthaler, *supra*, note 33; Economic Council, *Reforming Regulation*, *supra*, note 8; N. Ashford, *Crisis in the Workplace: Occupational Disease and Injury* (Cambridge, MA: MIT Press, 1976), pp. 333-359.

292. See U. S. CEQ, *supra*, note 40, at p. 233.

293. See CEQ, *Ibid.*, pp. 230-231; on asbestos, see *Corporate Crime*, *supra*, note 215, at p. 25.

294. Reschenthaler, *supra*, note 33, at p. 11.

295. See text accompanying notes 85-93, above. Several jurisdictions specifically prohibit the disclosure of information obtained by occupational health and safety inspectors which is classified as a "trade secret." See Canadian Employment Safety and Health Guide (Don Mills, Ontario: CCH Canadian Ltd., 1982, 2 vols.), paragraphs 40,020 (Canada Labour Code), 41,030 (British Columbia), 41,520 (Manitoba), 42,020 (New Brunswick), 43,525 (Ontario), 44,025 (P.E.I.), 44,530 (Québec), 45,015 (Saskatchewan).

296. Canada Dept. of Regional Economic Expansion, *Single-Sector Communities* (Ottawa: DREE, 1979).

297. M. MacCarthy, "A Review of Some Normative and Conceptual Issues in Occupational Safety and Health" (1981-82), 9 *Boston College Environmental Affairs Law Review* 773, at p. 780.

298. On asbestos in consumer products see "Asbestos Comes Home to Roost" (August 1979), 9 *Canadian Consumer* 34; R. Merrill, "CPSC Regulation of Cancer Risks in Consumer Products: 1972-1981" (1981), 67 *Virginia Law Review* 1261, at pp. 1346-1351. The case of urea formaldehyde foam insulation is dealt with in a forthcoming Law Reform Commission Working Paper on consumer product hazards.

299. Stigler has claimed that: "There is no imperfection in a market possessing incomplete knowledge if it would not be remunerative to acquire (produce) complete knowledge...." (quoted by T. Crocker, "Cost-Benefit Analyses of Cost-Benefit Analysis," in Peskin and Seskin, eds., *supra*, note 258, p. 341. See also Macaulay and Yandle, *supra*, note 209, p. 35.

300. Freedom of choice is an important "ideological dimension of the market system," often invoked without specification of the *reasons* for its perceived importance; see D. Hartle, *Public Policy Decision-Making and Regulation* (Montréal: Institute for Research on Public Policy, 1979), p. 150.

301. M. Millson and J. Brydon, "Registration/Notification of Chemicals," notes for presentation reproduced as Appendix F of *Roundtable Discussion*, *supra*, note 16, p. 2.

302. See *supra*, note 183 (on pharmaceuticals); Sunday Times Insight Team, *Destination Disaster* (New York: Quadrangle, 1976) (on the DC-10); P. von Stackelberg, "U. S. Problems with Drug Tests Cloud Our Health" and "U. S. Agency Critical of Tests," *Edmonton Journal*, April 3, 1982, pp. A1, A3.

303. Miller, *supra*, note 283; P. Hutt, "Individual Freedom and Government Control of Food Safety: Saccharin and Food Additives," Hammond and Selikoff, eds., *supra*, note 83.

304. Lindblom, *supra*, note 125, at p. 153 asks:

> Can even a highly informed competent consumer vote for precisely the produce he wants? Only if the corporation has taken the initiative to put the product on the market. Although the consumer wields a powerful veto, the initiative is largely in corporate hands.

305. The constraint of "marketability" also means that many kinds of products will *not* be produced: see J. Coates, "Science, Technology and Social Choice," in W. Baker, ed., *Shaping the Future: Canada in a Global Society* (Ottawa: Centre for Policy and Management Studies, 1979).

306. A. Hirschman, *Exit, Voice and Loyalty* (Cambridge: Harvard University Fress, 1970). Lindblom (*supra*, note 125, p. 145) formulates the same distinction in the more comprehensible (although less widely cited) terms of the availability of the option of "reform" as well as that of "withdrawal."

307. R. Dahl, *After the Revolution? Authority in a Good Society* (New Haven: Yale University Press, 1970), pp. 115-129.

308. *Report of the Royal Commission on Corporate Concentration* (hereinafter Bryce) (Ottawa: Supply and Services Canada, 1978), pp. 29-31.

309. L. Osberg, *Economic Inequality in Canada* (Toronto: Butterworths, 1981), p. 27.

310. W. Clement, *The Canadian Corporate Elite* (Toronto: McClelland & Stewart, 1975), pp. 127-130. By 1980, sixty-five industrial corporations in Canada had sales of more than $1 billion a year, and fifty-two (excluding publicly owned utilities) controlled assets worth at least that amount. Source: "Financial Post 500 Directory," special issue, *Financial Post Magazine*, June 1981.

311. P. Blumberg, *Inequality in an Age of Decline* (New York: Oxford, 1980), p. 177.

312. Figures from *Forbes*, July 6, 1981 as cited in (1981), 2:11 *Multinational Monitor* 2.

313. O. Freeman and W. Persen, "Multinational Corporations: Hope for the Poorest Nations" (1980), 14:6 *The Futurist* 3.

314. J. K. Galbraith, *Economics and the Public Purpose* (New York: Signet, 1975), pp. 38-50, 106-141. See also his *The New Industrial State* (New York: Signet, 1967).

315. In some extreme cases such as defence production and nuclear power reactor development, the line between corporation and government becomes almost indiscernible. However this exception should not distract us from the more general point being made, which is that corporations operate in a way analogous to governments *independent* of their relations with governments. See *infra*, notes 330-335, and accompanying text.

316. The point at which the concentration of production under the control of a few firms begins seriously to affect the workings of a market is a point of constant contention among economists; see Bryce, *supra*, note 308, pp. 69-

101. In the present context, it should be noted that if a firm is a major contributor to economic activity in a particular region, it may emerge as a dominant political actor well before its share of a particular market gives economists cause for concern on the basis of the erosion of competition.

317. D. Braybrooke, "Skepticism of Wants, and Certain Subversive Effects of Corporations on American Values," in T. Beauchamp and N. Bowie, eds., *Ethical Theory and Business* (Englewood Cliffs, N.J.: Prentice-Hall, 1979); S. Ewen, *Captains of Consciousness* (New York: McGraw-Hill, 1976); Galbraith, *The New Industrial State*, *supra*, note 314, pp. 208-228.

318. This example is suggested by D. Leyton-Brown, *The Nation-State and Multinational Enterprise: Erosion or Assertion?* (Toronto: Behind the Headlines, No. 60, Canadian Institute of International Affairs, 1982), p. 6. Leyton-Brown observes only that multiple-sourcing reduces the corporation's ability to operate at maximum profitability, ignoring both the additional leverage multiple-sourcing gives the firm in its relationships with labour and governments and the fact that such leverage is restricted to TNCs on an international scale, and large corporations more generally on an intranational scale.

319. J. Scott, *Corporations, Classes and Capitalism* (London: Hutchinson, 1979), pp. 139-142.

320. See Bryce, *supra*, note 308, pp. 50-51.

321. B. Snell, "Annual Style Change in the Automobile Industry as an Unfair Method of Competition" (1971), 80 *Yale Law Journal* 567.

322. M. Best and W. Connolly, "Market Images and Corporate Power: Beyond the 'Economics of Environmental Management,'" in K. Dolbeare, ed., *Public Policy Evaluation, Yearbooks in Politics and Public Policy* 2 (Beverley Hills, CA: Sage, 1975), pp. 48-49 (citing a report by Snell for the U. S. Senate Subcommittee on Antitrust and Monopoly which is now unavailable).

323. J. Blair, *The Control of Oil* (New York: Vintage, 1976).

324. B. Bluestone and B. Harrison, *The Deindustrialization of America* (New York: Basic Books, 1982), pp. 149-160.

325. D. Potter (of General Motors), "Comment," in R. Crandall and L. Lave, eds., *The Scientific Basis of Health and Safety Regulation* (Washington, D. C.: The Brookings Institution, 1982), p. 292. For a critique of such arguments see Braybrooke, *supra*, note 317.

326. M. Nadel, *Corporations and Political Accountability* (Lexington, MA: D. C. Heath, 1976).

327. *Ibid.*, pp. 114-115.

328. *Ibid.*, pp. 115-116.

329. *Ibid.*, pp. 119-164; C. Nader, "Controlling Environmental Health Hazards: Corporate Power, Individual Freedom and Social Control," in Hammond and Selikoff, eds., *supra*, note 83, pp. 215-220.

330. J. Coffee, "No Soul to Damn, No Body to Kick: An Unscandalized Inquiry into the Problem of Corporate Punishment" (1981), 79 *Michigan Law Review* 386, at p. 406. Seskin (*supra*, note 248, p. 85) notes that the adverse financial impact on auto manufacturers which would have followed from applying the penalties provided by legislation for failure to meet U. S. automobile emissions standards prevented their imposition on major manufacturers. "Quite simply, EPA was not prepared to shut down the Chrysler Corporation" in 1973, even though other manufacturers were able to meet the standard. The same effect can be observed on a regional level where a firm is a major employer within a region; see *infra*, note 359.

331. The distinction between sanction and situational bindingness in government policy is not as clear as it might seem. For example, criminal prosecutions and the use of discretionary policy powers may be sanction binding *de jure* but situationally binding *de facto* because of the tremendous expenditure of time and effort needed for opposition, and simply because opposition is required but can only be effective after the fact. The power of the state in this case, like that of the corporation, can be defined in terms of ability to compel either acquiescence or investment in resistance.

332. P. Evans, "Recent Research on Multinational Corporations" (1981), 7 *Annual Review of Sociology* 199, pp. 217-218.

333. C. Stone, "The Place of Enterprise Liability in the Control of Corporate Conduct" (1980), 90 *Yale Law Journal* 1, at p. 31.

334. J. Fayerweather, *International Business Strategy and Administration* (Cambridge, MA: Ballinger, 1978), pp. 3 and 125; P. Marchak, *In Whose Interests? An Essay on Multinational Corporations in a Canadian Context* (Toronto: McClelland & Stewart, 1979), pp. 131-159; S Hymer, "The Multinational Corporation and the Law of Uneven Development" and "The Multinational Corporation and the International Division of Labour," in Hymer, *The Multinational Corporation: A Radical Approach* (Cambridge: Cambridge University Press, 1979).

335. G. Geis and J. Monahan, "The Social Ecology of Violence," in T. Lickona, ed., *Moral Development and Behavior* (New York: Holt, Rinehart & Winston, 1976), pp. 351-352.

336. *Grimshaw and Gray* vs. *Ford*, *supra*, note 238, A25.3, October 31, 1977, pp. 39-50.

337. Internal Occidental memoranda and testimony of company officials in *Hazardous Waste Disposal*, Part I, Hearings before Subcommittee on Oversight and Investigations, Committee on Interstate and Foreign Commerce, U. S. House of Representatives, 96th Cong., 1st Sess., Committee Print 96-48 (Washington, D. C.: U. S. Government Printing Office, 1979), pp. 1567-1598.

338. S. Sethi, *Up Against the Corporate Wall*, 4th ed. (Englewood Cliffs, NJ: Prentice-Hall, 1982), pp. 99-117.

339. Or for the view that "the most shocking safety and environmental violations are almost exclusively the product of decisions at lower managerial levels"

expressed by Coffee, *supra*, note 330, p. 397. See also Stone, *supra*, note 333, pp. 33-34, where a similar view is implied.

340. Coffee, *ibid.*, pp. 396-397; M. Clinard and P. Yeager, *Corporate Crime* (New York: The Free Press, 1980), pp. 44-46; C. Stone, *Where the Law Ends: Social Control of Corporate Behavior* (New York: Harper Colophon, 1975), pp. 61-63.

341. Law Reform Commission of Canada, *Criminal Responsibility for Group Action* [Working Paper 16] (Ottawa: Information Canada, 1976), p. 17.

342. *Ibid.*, pp. 18-19. This is itself an important acknowledgement of the tremendous disparity in power and resources between large corporations and other "persons" under the law.

343. Stone, *supra*, note 340, at p. 7.

344. M. Ermann and R. Lundman, "Overview," in Ermann and Lundman, eds., *supra*, note 183, at pp. 6-7. See also Marchak, *supra*, note 334, pp. 201-230.

345. C. Madden, "Forces Which Influence Ethical Behavior," The American Assembly, ed., *The Ethics of Corporate Conduct* (Englewood Cliffs, NJ: Prentice-Hall, 1979), pp. 60-61.

346. Coffee, *supra*, note 330, pp. 397-399; Clinard and Yeager, *supra*, note 340, pp. 272-278.

347. Clinard and Yeager, *supra*, note 340, p. 60; M. Green, "When Corporations Become Consumer Lobbyists," in T. Bradshaw and D. Vogel, eds., *Corporations and Their Critics* (New York: McGraw-Hill, 1981), pp. 18-19. Similarly, the Pinto and Corvair automobiles (both of which contained design faults which later became notorious) were "linked to the career of an ambitious, fast-track executive," Lee Iacocca at Ford and Edward Cole at General Motors. Their intense commitment to these projects might have conveyed a damn-the-externalities approach quite as effectively as any stated corporate policy. See P. Halpern, "The Corvair, the Pinto and Corporate Behavior: Implications for Regulatory Reform" (1983), 1 *Policy Studies Review* 540.

348. Recall the discussion of the ability to externalize production costs in Chapter Three, and the advantages this ability confers on the producing firm.

349. S. Brenner and E. Molander, "Is the Ethics of Business Changing" (1977), 55:1 *Harvard Business Review* 57. Respondents complained both of direct pressure from superiors and of superiors' indifference to the methods used as long as results were satisfactory.

350. J. Armstrong, "Social Irresponsibility in Management" (1977), 5:3 *Journal of Business Research* 185.

351. The background to the Panalba case can be found in M. Mintz, "FDA and Panalba: A Conflict of Commercial Goals?" (1965), 165 *Science* 875.

352. Armstrong, *supra*, note 350, pp. 200 and 207.

353. Coffee, *supra*, note 340; J. Coffee, "Corporate Crime and Punishment: A Non-Chicago View of the Economics of Criminal Sanctions" (1980), 17 *American Criminal Law Review* 419; L. Orland, "Reflections on Corporate Crime: Law in Search of Theory and Scholarship" (1980), 17 *American Criminal Law Review* 501, especially pp. 515 to 518; Stone, *supra*, note 333.

354. For instance, Shell Chemical could afford to spend over $1 million defending the U. S. registration of Aldrin/Dieldrin (Epstein, *supra*, note 175, p. 292); and Ford Motor Company to spend more than $1 million on its criminal defence in the Pinto case (Strobel, *supra*, note 238) in addition to its involvement in numerous civil suits. Within the realm of conventional economic regulation, Bell Canada has spent more than $1 million in some years to defend its annual rate application before the CRTC (Engelhart and Trebilcock, *supra*, note 116, p. 43).

355. Coffee, *supra*, note 330, pp. 401-403; Orland, *supra*, note 353, pp. 514-515.

356. See Braybrooke, *supra*, note 317, and Ewen, *supra*, note 317.

357. See Sethi, *supra*, note 338, pp. 162-205 on an extensive advocacy campaign carried out by Bethlehem Steel to promote "pro-industry" economic policies and relaxation of health and safety regulations; G. Speth, "Environmental Regulation and the Immobilization of Truth" (1980), 8 *Boston College Environmental Affairs Law Review* 413, pp. 418-420.

358. *E.g.* T. Crocker, "Some Economics of Air Pollution Control" (1968), 8 *Natural Resources Journal* 236, at pp. 242-243; Etzioni, *supra*, note 139; A. Wiener, "Some Functions of Attitudes toward Economic Growth," in K. Wilson, ed., *Prospects for Growth* (New York: Praeger, 1977).

359. Troyer, *supra*, note 77 (on Reed Paper and Dryden, Ontario); A. Miller, "Towards an Environmental-Labor Coalition" (1980), 22:5 *Environment* 32 (on General Motors in Tarrytown, New York and U.S. Steel and Republic Steel in Youngstown, Niles and Warren, Ohio); P. Portney, "Toxic Substance Policy and the Protection of Human Health," in Portney, ed., *supra*, note 39 (on the dumping by Reserve Mining of asbestos-laden tailings into Lake Superior); E. Greer, *Big Steel: Black Politics and Corporate Power in Gary, Indiana* (New York: Monthly Review Press, 1979), Ch. 8 (on U. S. Steel in Gary); D. Jordan, "The Town Dilemma" (1977), 19:2 *Environment* 6 (on PCB emissions fromWestinghouse plant in Bloomington, Indiana); Tataryn, *supra*, note 144, pp. 61-105 (on uranium mining in Elliot Lake, Ont. and the opposition by local residents to workers' demands for reduction of hazards in the workplace); Crocker, *supra*, note 358, p. 242 (on air pollution from phosphate plants in Florida); and so forth.

360. The best example of how this process works in practice may be the guidelines for submissions to the Ontario Cabinet cited by Doern; see *supra*, note 66 and accompanying text.

361. On Inco, see Felske, *supra*, note 8; on Reed, see Troyer, *supra*, note 77; on both cases, Ontario Legislature Standing Committee on Resources Development, *supra*, note 32.

362. D. Estrin, "The Legal and Administrative Management of Ontario's Air Resources, 1967-74," Elder, ed., *supra*, note 8, pp. 201-208.

363. M. Bucovetsky, "The Mining Industry and the Great Tax Reform Debate," in P. Pross, ed., *Pressure Group Behaviour in Canadian Politics* (Toronto: McGraw-Hill Ryerson, 1975).

364. *E.g.* R. Barnet and R. Mueller, *Global Reach* (New York: Simon & Schuster, 1974); N. Howenstine, "Growth of U. S. Multinational Companies, 1966-77" (1982), 62:4 *Survey of Current Business* 34; Hymer, *supra*, note 334; A. Martinelli, "The Political and Social Impact of Transnational Corporations," in H. Makler, ed. (1982), 26 *The New International Economy, Sage Studies in International Sociology* (Beverley Hills: Sage, 1982); P. Susman, "Regional Restructuring and Transnational Corporations" (1981), 13:2 *Antipode* 15.

365. See Hymer, *supra*, note 334. "The successful global competitor manages its business in various countries as a single system, not a portfolio of independent positions," according to T. Hout, "How Global Companies Win Out" (1982), 60:5 *Harvard Business Review* 98. In a striking example of such global production and marketing planning, Ford's European Escort "world car" is made up of parts manufactured in seventeen different countries, ranging from Austrian heater hoses to Swiss speedometer gears and U.S.-made wheel nuts and hydraulic lifters. See M. Anderson, "Shake-Out in Detroit: New Technology, New Problems" (August-September 1982), 85 *Technology Review* 56.

366. Y. Doz and C. Prahalad, "How MNCs Cope with Host Government Intervention" (1980), 58:2 *Harvard Business Review* 149, at p. 150.

367. Fayerweather, *supra*, note 334, at pp. 186-187; S. H. Robock, *International Business and Multinational Enterprises* (Homewood, IL: R.D. Irwin, Inc., rev. ed., 1977), pp. 245-247, 251, 253-258.

368. Neff, *supra*, note 53, p. 6.

369. Canadian Chemical Producers' Association, "Position Paper on Confidentiality," reproduced in Appendix C of *Roundtable Discussion*, *supra*, note 16.

370. Comments of J. Bélanger, President, CCPA, in Peterson Committee, *Minutes of Proceedings* 14, October 14, 1980, p. 4.

371. Ontario Legislature Standing Committee on Resources Development, *supra*, note 32, pp. 92-95.

372. "Financial Post 500," *supra*, note 310.

373. Fayerweather, *supra*, note 334, pp. 184-193. On the role of labour (anti-labour?) legislation in affecting investment climate and the movement of corporate operations within the United States to avoid unionization, see Bluestone and Harrison, *supra*, note 324, pp. 164-180.

374. Doz and Prahalad (*supra*, note 366, p. 150) quote "the head of European operations" for one TNC to the effect that:

> On any significant decision such as plant construction, plant closing, or reallocation of production, we take a first cut at an economically optimal solution; then we amend this economic solution to fit with the demands

of governments and arrive at a compromise that is acceptable both to the governments and to our top management in the United States.

When such a compromise cannot be reached, the issue may be resolved through unilateral action by the corporate headquarters. For example, Ford Motor Company indicated its intention to refuse to advance any additional operating funds to its money-losing Dutch subsidiary regardless of whether or not its plans to shut down Ford Nederland complied with that country's legislation on plant closings. See the letter of J. McDougall, Executive Vice-President, Ford International Automotive Operations, Dearborn, Michigan to G. Laurent, Managing Director, Ford Nederland, September 10, 1981. (The author is indebted to Beth Johnson of the Corporate Accountability Research Group for providing this letter.) The Enterprise Chamber of the Amsterdam Appeals Court eventually decided that the closing was justifiable on the basis of the absence of prospects of future profitability for Ford Nederland's operations (see "Ford-Amsterdam: Closure and Social Plan," (1982), 2 ILO *Social and Labour Bulletin* 231), but it is not clear what — if anything — the elected authorities could have done even if the opposite conclusion had been reached.

375. National Research Council (U.S.) Committee on Risk and Decision-Making, as cited by R. and J. Kasperson, "Determining the Acceptability of Risk: Ethical and Policy Issues," in J. Rogers and D. Bates, eds., *Risk: Proceedings of a Symposium on the Assessment and Perception of Risk to Human Health in Canada* (Ottawa: Royal Society of Canada, 1983), p. 144.

376. Reasons, *supra*, note 50; H. Glasbeek and S. Rowland, "Are Injuring and Killing at Work Crimes?" (1979), 17 *Osgoode Hall Law Journal* 506.

377. On the general advantages accorded to rich criminal defendants, see Law Reform Commission of Canada, *Our Criminal Law* (Ottawa: Information Canada, 1976), pp. 9, 12; L. Tepperman, *Crime Control* (Toronto: McGraw-Hill Ryerson, 1977), pp. 158-191. On the particular relevance of this issue for cases of "corporate crime," see *inter alia* Clinard and Yeager, *supra*, note 340, pp. 288-292; Coffee, "Corporate Crime," *supra*, note 353, p. 462; Reschenthaler, *supra*, note 33, pp. 82-83. On the similar backgrounds of potential defendants in cases involving corporate actions and those individuals deciding on their prosecution and sentencing, see D. Olsen, *The State Elite* (Toronto: McClelland & Stewart, 1980), pp. 42-83.

378. D. Trezise, "Alternative Approaches to Legal Control of Environmental Quality in Canada" (1975), 21 *McGill Law Journal* 404, at p. 410.

379. Geis and Monahan, *supra*, note 335.

380. E. Keyserlingk, *Environmental Pollution as Crime: Some Conceptual Considerations*, a forthcoming publication of the Law Reform Commission of Canada.

381. R. Zeckhauser and J. Shepard, "Principles for Saving and Valuing Lives," in Ferguson and LeVeen, eds., *supra*, note 231, at pp. 112-117.

382. In this context, it is interesting to note that the formal application of cost-benefit analysis is usually proposed only in areas where industry stands to lose from governmental activity. It is almost never proposed to apply such

formal analysis to, *e.g.*, defence expenditures which keep a whole sector of the corporate economy active; to the incremental effects of "tax expenditures" such as accelerated depreciation which are supposed to promote industrial investment; or to the effects of tariff or non-tariff protection for a nation's domestic industries.

383. Vaupel, *supra*, note 231, p. 9.

384. Geis and Monahan, *supra*, note 335, pp. 354-355. See also C. Nader, "Controlling Environmental Health Hazards," in Hammond and Selikoff, eds., *supra*, note 83.

385. For the earlier history of this controversy, see R. Nader, *Unsafe at Any Speed* (New York: Grossman, 1965). Somewhat more recent information is provided by J. Flink, *The Car Culture* (Cambridge, MA: MIT Press, 1975), pp. 216-218.

386. Baumol and Oates, *supra*, note 210, pp. 350-357.

387. Coffee, *supra*, note 330, pp. 389-400.

388. G. Majone, "Choice among Policy Instruments for Pollution Control" (1976), 2 *Policy Analysis* 589, at p. 592.

389. Castrilli and Lax, *supra*, note 8, pp. 374-375.

390. An extensive summary of such legislative provisions and their limitations is provided by M. Nash, *Canadian Occupational Health and Safety Law Handbook* (Toronto: CCH Canadian Ltd., 1983), pp 97-126; see also Reasons, *supra*, note 50, p. 263.

391. "Awards of Attorneys' Fees to Unsuccessful Environmental Litigants" (1983), 96 *Harvard Law Review* 677.